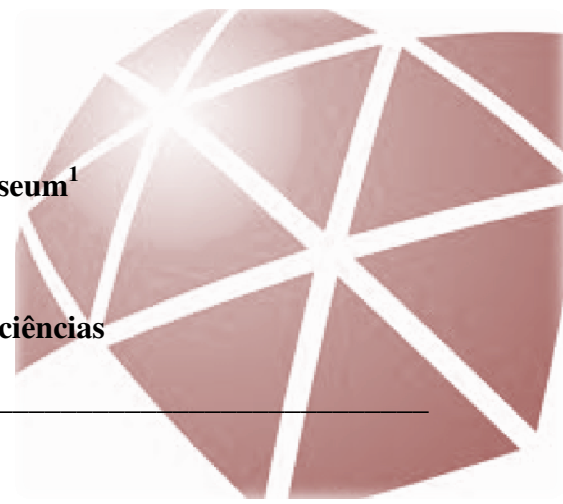


**Preserve and protect in a science museum<sup>1</sup>**

**Preservar e proteger em um museu de ciências**



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**Abstract:** Reflections on the university campus usually focus on its relevancy as a research and teaching area; however, the need for preservation, protection, maintenance and cleaning only become visible in the event of inadequacy or lack thereof. The aim of this study is to address the characteristics of the preservation and security measures performed at the Science and Technology Park of the University of São Paulo (*Parque de Ciência e Tecnologia da Universidade de São Paulo*), agency subjected to the Dean's Office for Culture and University Extension (*Pró-Reitoria de Cultura e Extensão Universitária*). Because of its history and location, the Park requires special care. The Park's land formerly housed the Astronomical Observatory of São Paulo and the Institute of Astronomy and Geophysics of the University of São Paulo (*Instituto de Astronomia e Geofísica – IAG-USP*), within the Fontes do Ipiranga State Park (*Parque Estadual das Fontes do Ipiranga – PEFI*), in the city of São Paulo. Preservation and reconversion activities relative to historical buildings are developed at the Park. The institution's location and its specificities require security in its borders, as well as in relation to the users of the park.

**Keywords:** environmental preservation; architectural preservation; reconversion; security.

**Resumo:** O espaço universitário é compreendido como o da pesquisa e do estudo, mas as necessidades diárias de preservação, proteção, manutenção e limpeza só se tornam visíveis quando falham ou faltam. Apresentamos as características das funções de preservação e segurança que foram/são realizadas no Parque de Ciência e Tecnologia da Universidade de São Paulo, órgão da Pró-Reitoria de Cultura e Extensão Universitária que, por sua localização e histórico, necessita de cuidados especiais. Ele se localiza no espaço físico onde antes existiu o Observatório Astronômico de São Paulo, depois, Instituto de Astronomia e Geofísica – IAG-USP, no interior do Parque Estadual das Fontes do Ipiranga - PEFI, na cidade de São Paulo. Há nele atividades de preservação e de reconversão de edifícios históricos. E a localização da instituição e suas características específicas exigem condições de segurança nos pontos de contato com a comunidade do entorno e com os usuários do espaço.

**Palavras-chave:** preservação ambiental; preservação arquitetônica; reconversão; segurança.

## **Introduction**

The university space is primarily understood as a place for research and study; however, daily activities required for preservation, protection, maintenance, and cleaning tend to be forgotten because they are mundane and only become visible when they fail or are lacking. Maintenance and cleaning systems are the responsibility of each unit according to their specific needs, which vary greatly. For matters related to architectural, document, and environmental preservation and safety, there are always two levels of action: macro - responsibility of the University's general administration through its coordinating bodies such as Campus City Halls, Superintendence of Physical Space - SEF, Superintendence of Environmental Management, Superintendence of University Prevention and Protection, the General Archives of USP-SAUSP, the Center for Cultural Preservation - CPC-USP; and micro, the responsibility of each unit.

The University of São Paulo has a tradition regarding issues of preservation of heritage in its various media, as we see in bibliographic production. (CADERNOS DO CPC series, 1997 to 2005; WITTER, 1997; OLIVEIRA FILHO, 1996).

The University of São Paulo Science and Technology Park - USP-CIENTEC Park,<sup>2</sup> an entity run by the Department of Culture and Extension at the University of São Paulo, is a museum institution<sup>3</sup> that, due to its specific characteristics, demands special care in maintaining existing spaces and buildings, preservation and renovation of historic buildings, and in safety of the environment as a whole.

### **1 Location**

The CIENTEC-/PRCEU-USP Park is located in the southern portion of the city of São Paulo. It was created on November 23, 2001, foreseeing the use of the area belonging to the University in Fontes de Ipiranga State Park. (Ordinance GR 3.313, *Official Gazette* of the State of São Paulo on December 14, 2001).<sup>4</sup>

Fontes do Ipiranga State Park - PEFI, better known simply as State Park, located in the Água Funda district, defines the city limits between São Paulo and the municipalities of Diadema and São Bernardo do Campo, and it is surrounded by the districts of Jabaquara, Cidade Ademar, Saúde, Cursino, and Sacomã (Image 01).



Image 01 - Location of PEFI between São Paulo districts and neighboring municipalities. Source: elaborated by the authors.

CIENTEC Park occupies an area of 141 hectares from a total 545 hectares that make up PEFI, which include small fractions of forest separated by the Imigrantes Highway. (BICUDO et al., 2002). With the exception of 21 hectares that in the 1930s were allocated to house buildings and activities of the then São Paulo Observatory (SANTOS, 2005), the remaining 120 hectares are covered by Atlantic Forest and constitute more than 1/3 of the preserved forest in PEFI.

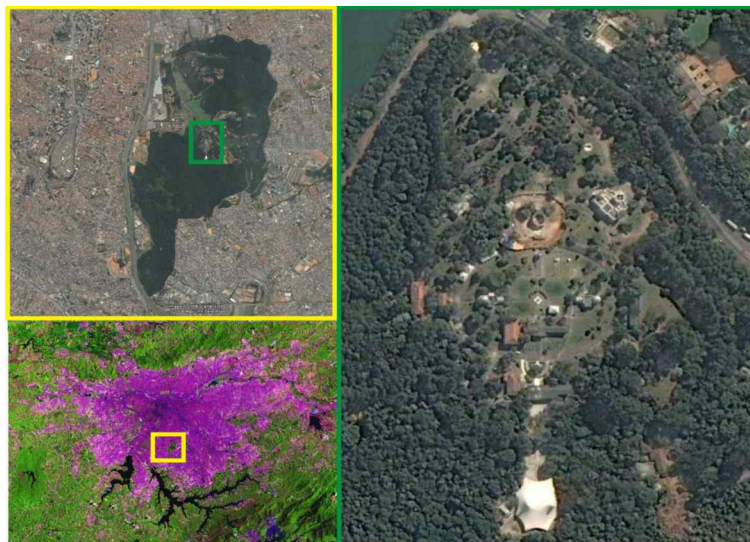


Image 02 - from the lower left corner, clockwise: satellite picture of the metropolitan region of São Paulo with PEFI in the yellow rectangle; enlargement of the preceding image with PEFI in detail, and CIENTEC in the green rectangle; enlargement of the preceding image showing the main area of CIENTEC Park. Source: prepared by authors from Google Images and the State Government.

From the aircrafts approaching Congonhas airport, it is possible to see PEFI emerging as a green spot on the gray cluster of densely urbanized area comprising the São Paulo metropolis.

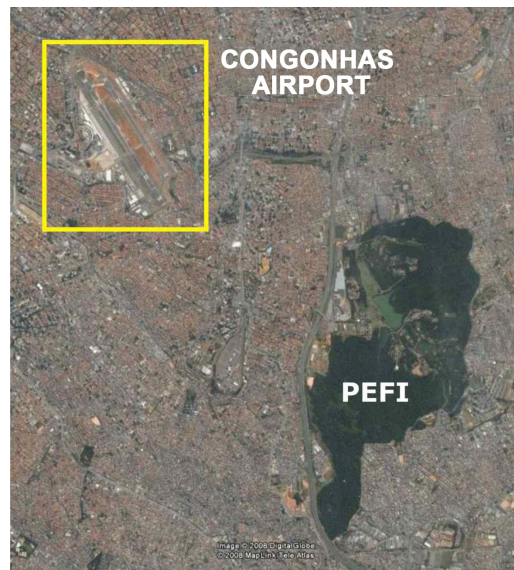


Image 03 - Relation between PEFI and the Congonhas Airport. Source: elaborated by the authors from Google Images.

Reviewing Image 02, on the left, you can see that spot more clearly, which constitutes about 10% of all green areas in the city of São Paulo. The “Conservation Unit” that resists urbanization (BICUDO et al., 2002.) is an environmental heritage that must be preserved and protected from the constant invasions encroaching upon its borders. Its use for hunting wild animals or as a hiding place for drug use, practices that routinely occur, should also be inhibited. Preservation of the forest in adjacent regions requires constant visits to those areas, implementation of environmental education programs to the surrounding population and long-term presence of people with accurate knowledge of the region.

## ***2 Preserve: maintenance and reconversion***

In the 21 hectares occupied by historic and recent buildings and by CIENTEC Park activities, there is a constant need for everyday activities that go unnoticed by visitors. There is the mandatory need for cleaning common-use areas and buildings, upkeep of buildings in use, restoration processes, conversion processes, in addition to renovations and repairs, whether of old buildings or equipment in outdoor areas.

### **2.1 Daily maintenance**

The everyday cleaning tasks are performed by an outsourced company, guided by a CIENTEC official with several years of experience in building maintenance, who oversees historical property. Routine cleaning was hired for the areas in which indoor activities are carried out, related to visitation, management, or operational techniques, for the period from Monday to Saturday. When events occur on Saturday afternoons or on Sundays, cleaning staff is rescheduled, as well as surveillance.

Along with cleaning, there is a demand for countless repairs of electrical and plumbing installations, masonry, slabs, roofs, sidewalks, etc., due to infiltration, leaking gutters and pipes, among others, which require the constant presence of professionals in the field (Image 04). These repairs, at times characterized as renovations, apply to the 25 mentioned buildings and 10 other simpler houses. This was referred to as a Colony because in the 1930s and 40s residences were built for employees in the Observatory area, considering its great distance from the urbanized area of the city. Today they are partially and strategically occupied by former employees of the Institute of Astronomy, Geophysics, and Atmospheric Sciences (IAG/USP) currently allotted to CIENTEC, aiming to protect and maintain the occupied space.



Figure 04 - Full replacement of the slab weatherproofing system for CIENTEC Park's main building (Building 05, Administration). Source: elaborated by the authors.

Construction professionals - such as masons, electricians, plumbers, carpenters, and maintenance assistants - are constantly active, often handling emergencies due to logistical conditions such as lightning, fallen branches, or even trees on outdoor wiring, changing light bulbs and their bases, installation of telephone, network points or extensions, infiltration of rain water at points where the original sealing no longer works, leaks in different plumbing parts, which are being replaced gradually, repair of gutters and roof runoff, and even deployment of PURA (Program for the Rational Use of Water) and PURE (Permanent Program for the Efficient Use of Energy), among other programs.

The distance of more than 20 km from CIENTEC Park to USP's main campus, Armando Salles de Oliveira, in the Butantã district of São Paulo, hinders movement of professionals from one space to another. Outsourcing these daily services is complex and slow due to compliance with bureaucratic demands, in light of the quantity and continuity of services needed.

Added to the 10 historic buildings are 13 newer buildings, built over the course of the 1970s to the 1990s and totaling 3224.58 m<sup>2</sup>, 9 tiny utility buildings (with a total of 116.39 m<sup>2</sup>), 10 small residences located in three strategic locations (3 residential complexes measuring 808.11 m<sup>2</sup>) that require various costly repairs, which, along with the historic buildings, total 7,367.40 m<sup>2</sup>. Constant maintenance of the referenced buildings is always imperative in order to house activities and, in the latter case, inhabitants.

## 2.2 Preservation and reversion

With regard to buildings, the 10 historic buildings scattered around 21 acres are small, comprising a total area of 3,338.71 m<sup>2</sup> (Image 05). According to the restoration project and the plan for converting the space and waiting for its achievement in view of the costs involved that require lengthy bidding processes, the buildings are used for educational and cultural activities.



Image 05 - Map of the buildings and activities in CIENTEC Park. Source: elaborated by the authors.

The existing small exhibition area, divided and scattered over 21 hectares, guided the endeavor to make better use of outdoor areas. However, the distance between various buildings, starting from the entry at the lowest point of CIENTEC, may be a serious barrier to elderly visitors or those with limited mobility due to major slopes that reach about 23m. In the social inclusion context, the safety of visitors requires a plan for specific mobility equipment to accommodate, even

in sporadic cases, visitors with limitations. Equipment required for outdoor areas differ from those for indoor areas.

An electric cart was purchased in planning activities for CIENTEC Park (Image 06), in order to include people with mobility difficulties in visitation.



Image 06 - Electric vehicle. Source: elaborated by the authors.

Elevator platforms were planned and installed for indoor spaces in buildings with two floors of visitation, which are currently the César Lattes Museum (building 19) and the Marcelo Damy de Souza Santos building, where the Digital Planetarium is installed (building 04).

Guardrails for indoor and outdoor environments (Image 07) were also provided for visitation spaces in general. In buildings with electricity experiments, the grounding and lightning rod design is being implemented at SEF (Image 08).



Image 07 - Guard rails installed in Building 19 of CIENTEC. Source: elaborated by the authors.



Image 08 - Technicians from the Institute of Electrotechnology and Energy - IEE/USP analyzing the possibilities of deploying a lightning rod system through the building's metal frame. Source: Elaborated by the authors.

### ***Reconversion***

In the basic deployment plan for CIENTEC Park, conversions were planned for historic buildings. <sup>5</sup>The first to be carried out was building 04, which was called Paleomagnetism, at IAG/USP, and the Great Equatorial Pavilion in the Astronomical Observatory, for which there was a plan to install a spyglass, which did not occur due to the Second World War. The conversion of building 04, now called Marcelo Damy de Souza Santos, was completed (Image 09), which is where the now operational Digital Planetarium was installed. The conversion project was designed by Paul Bruna and Nestor Goulart Reis Filho, and the inauguration of the converted building was on June 21, 2010.

The next planned step is to convert building 10, originally the Casa do Zelador (The Caretaker's House), today being the Luiz Bernardo F. Clauzet auditorium.



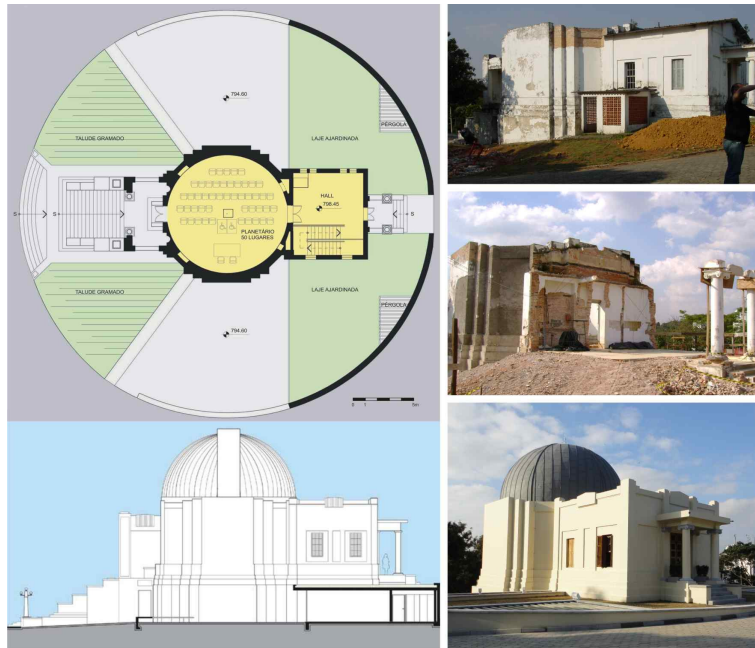


Image 09 - Building 04 - Digital Planetarium. Clockwise, starting from the lower left corner: design cross-section; blueprint; situation upon commencing works; intermediate work execution stage; finished work. Source: elaborated by the authors.

As part of the historic structure conversion and maintenance process, the fence screen along Ave. Miguel Stefano, across from the park, was fully replaced by a rail fence, maintaining, however, the original stone-coated wall.



Image 10 - New fence of the CIENTEC Park. Source: elaborated by the authors.  
Some Activities

With the deployed activities and the digital inclusion proposal, CIENTEC Park has a relatively large computer hardware and software infrastructure. Some of the deployed systems (Images11, 12, and 13) require knowledge of software specifically developed for these activities.

Aside from these, several programs (Images 14 and 15) and machines for research, editing images in various formats, text editing, camera tracking, administration, etc., need special and constant care: Weekly or monthly and maintenance back-ups. Human resources specialized in the topic are needed to meet these requirements, which is also part of the CIENTEC Park safety item.



Image 11 - Mario Schenberg Spacecraft, a virtual trip into space installed in building 19. Source: elaborated by the authors.

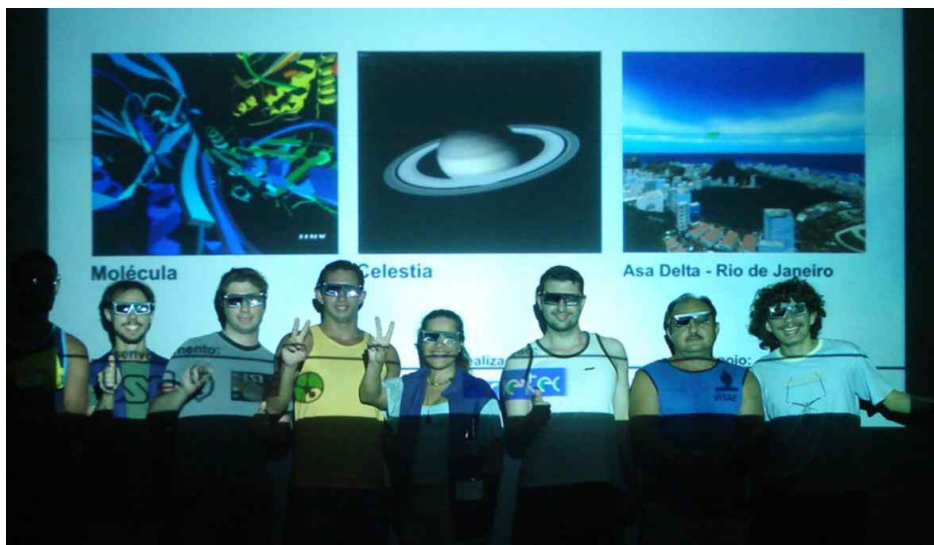


Image 12 - Digital Cave, with 3D projection, installed in the basement of building 15. Source: elaborated by the authors.



Image 13 - Digital Planetarium - equipment and simulation. Source: Evans & Sutherland page on the Internet.<sup>6</sup>



Image 14 - "Playing with Physics" activity on computers. <sup>7</sup>Source: elaborated by the authors.



Image 15 - Digital Inclusion: State government work front scholarship students at CIENTEC learning basic computer skills. <sup>8</sup>Source: Elaborated by the authors.

### ***3 Protect: Security in the CIENTEC Park***

In Brazil there are still few systematic studies concerning security for museums and collections in general. Up to just a few years ago, these were the target of outdoor vandalism that could have been resolved merely with greater surveillance and/or quick outdoor painting.

More recently, artistic and historical collections have been the object of media and public attention, because documentary collections and works of art from public collections are being stolen to be turned into private objects by thieves either connected to the international stolen artwork circuit, tracked by Interpol, or for a domestic market in formation, which can be seen in the database for checking Missing Cultural Property, (<http://portal.iphan.gov.br/consultaPublicaBCP/index.jsf>), organized by IPHAN.

There are a few studies on the subject of security, such as the one by MAST, 2006, although its scope does not cover the specific characteristics of the Park. Some curators are concerned about the matter, as can be seen in specialized articles regarding the issue of security. (KUSHNIR, 2009).

Organized forms of protection currently used in the Park result from the historical experience of space occupation by IAG-USP, which have been enhanced for the institution's new characteristics.

### **3.1 Security in territorial space**

An outsourced security service is not enough to protect the physical space of CIENTEC Park, nor is it possible to assign such tasks to the Environmental, Civilian, or Military Police. There is a need for continuous monitoring of its boundaries, which coincide with the limit between the city of São Paulo and Vila Campanário district in the city of Diadema. Dedicated people are needed, with knowledge of existing and potential problems, and experience in the area. In the face of such characteristics, the various institutions that share the PEFI space have guards on staff. These employees must be or become experts on the physical space and its problems. The watchmen of institutions that share the PEFI space (Institute of Botany, Zoo Foundation, Department of Agriculture and Food Supply, Imigrantes Expo Center, Center for Sports, Culture and Leisure, "Dr. David Capistrano Filho" Hospital, Department of Health, and CIENTEC Park) communicate directly or indirectly, and some actions are carried out together. The CIENTEC Park has a surveillance officer and three guards on its staff, who know the physical space in-depth and monitor the activities of outsourced surveillance employees.

The security guards of property surveillance companies perform other roles in which the turnover characteristic of outsourced employees does not cause major problems. They work in property security and protection activities, handling the routine control of circulating people via

individualized records of all persons entering for work and visitation purposes. Some employees work mainly in the 21-hectare area, where historical buildings are located and scientific communication activities are performed, both inside buildings and outdoors. There are 20 guards, including a driver and a motorcycle for pre-established rounds of different types: walking, motorized, indoor, around the institution, day shifts, night shifts, daily, and some only on weekends. In detail: (1) on foot, alternating between buildings, streets, walks, etc., every hour, (2) peripheral on foot, near the limits of built area, lake and near the forest, every hour, (3) motorized at night, every hour, interweaving and peripheral, and (4) motorized during daytime and on weekends. Outside the visitation area rounds are also performed: along the CIENTEC Park trails and fire lines (adjacent areas) 3 times per week, with 5 guards and a motorized patrol around the Park, also 3 times a week.

On special occasions, when greater visitation is expected, staff is increased, incurring extra expenses, and supplemented with the participation of Military Police and University Security. The Environmental Police also offers support for specific actions upon request, and so does the Military Police, through the Fire Department.

Given the location and physical area, there are several security issues due to scope and geography. There is ongoing concern over the intrusions that occur at its borders, particularly at the border with the municipality of Diadema. An irregular situation has persisted for a long time in the squatter area of the Campanário district, where four families live (Image 16). On Araçá Street, two families from the community near the park make use of a 20 m stretch of the fire line to enter their homes (in the border section where the boundary wall was built), because subsequent invasions obstructed access from the front of the lot. In other words, the back of the lot falls within the Park. To prevent further irregularities, a gate was placed to serve only these residents (Image 17). In the same location, a room built on a residence neighboring the Park advanced about 4 m (Image 18). In several places, the Park's boundary wall is used as the outer wall of homes that opened their windows into the park (Image 19).



Image 16 - Google image, to the left, picture taken on site, to the right. The yellow rectangles outline the invaded area, belonging to the CIENTEC Park, on the border with the municipality of Diadema. Source: elaborated by the authors.



Image 17 - Access gate and lock. Source: elaborated by the authors.



Image 18 - Area adjacent to PEFI showing the rooms of houses encroaching upon the Reserve area (yellow rectangles).  
Source: elaborated by the authors.



Image 19 - Gaps opening into PEFI. Source: elaborated by the authors.

In order to mitigate existing invasions and prevent new actions, control methods have been established, such as rounds on trails (Image 20) and fire lines (Image 21 - adjacent areas) around CIENTEC Park, as described.



Image 20 - Rounds on the trails and support from Environmental Police in border areas. Source: elaborated by the authors.



Image 21 - "Fire lines" - paths for the passage of surveillance vehicles. Source: elaborated by the authors.

A key preventive action was the system of surveillance cameras deployed, initially with 10 cameras installed. Other cameras still need to be installed in indoor and outdoor areas.





Image 22 – Surveillance cameras. Source: elaborated by the authors.

### **3.2 Individual safety**

Aside from physical safety through external action of visitors and those who work outdoors at the CIENTEC Park, personal safety can also be compromised if outside areas are not regularly and properly maintained and kept up. Lawn mowing, raking, pruning dead branches, tree inspection, removal of anthills, precautions to hinder the presence of venomous animals in passageways, etc., are everyday actions that can prevent accidents. With the same objective, a survey taken by biologist is requested biannually for the wooded area with native and foreign species, to issue a report and mark trees that may pose as a hazard, such as falling branches or complete fall. In the case of tree removal and replacement and replacement of species that pose some kind of risk (Image 23), PEFI's managing entity must be consulted, the Institute of Botany at the State Department of Environment, and the Secretariat of Green Areas and Environment of the São Paulo municipality.



Image 23 - Trees that need to be replaced. Source: elaborated by the authors.

For the everyday activities mentioned above there is an outsourced gardening contract. The tender contract is valid for maintenance of 49,115 m<sup>2</sup> of landscaped gardens/lawns, 64,200 m<sup>2</sup> of mid-sized vegetation (native forest), 17,500 m<sup>2</sup> of roads, sidewalks, and squares, and 4,000 m<sup>2</sup> of plant debris storage and composting, for a total of 134,815 m<sup>2</sup>. The contract lays out all precautions required for visitor safety.

In neighboring regions, where there is no visitation, there is a dense population of residents from the Jabaquara district of São Paulo and Vila Campanário in Diadema. The daily accumulation of trash thrown into the Park poses a concern to the residents of these communities, especially near Vila Campanário (Diadema). It is not only organic or open air waste (Image 24), but also objects such as furniture, mattresses, old appliances, rusty bicycles, tires, toys, among others, piled up in wooded areas near the boundary wall (Image 25). In addition to the danger of dengue, cases of spotted fever have occurred, originated from the lone star tick, common in areas of native forest and transported to inhabited areas by dogs or other abandoned pets.



Image 24 - Organic waste and release of sewage wastewater into parts of the CIENTEC Park by the resident population in the vicinity. Source: elaborated by the authors.



Image 25 - General, large-size dumping, across the boundaries of PEFI and Diadema. Source: elaborated by the authors.

In addition to an environmental education action with that population, though still modest on account of the shortage of human resources, the CIENTEC Park promotes cleaning of those areas every 3 months, hiring people who help remove and bag the dumped household waste. Furniture, mattresses, old appliances, and other objects are collected and removed in dumpsters provided by the city of Diadema, as the Park has partnered with the Department of Street Cleaning in the municipality. Also carried out in conjunction with the Diadema Department of Water and Sewage (DAED) was an action to channel into the main collection tank the sewage from the houses that was being released into the open air.

The contaminating effect on the land through such waste was verified by researchers from the Institute of Astronomy, Geophysics and Atmospheric Sciences - IAG-USP in subsequent years, which allowed us to observe its regression over time, as trash was being removed trash and open sewer was eliminated. (SOUZA et al., 2005; ELIS; MANTOVANI, 2006; CAPARICA et. al., 2006).

In order to minimize problems related to public health, abandoned animals, especially dogs, are captured and forwarded to the Animal Shelter Association, which receives abandoned animals, provides veterinary treatment, castration, and forwards them as donations.

Another item related to visitation and staff safety is the availability of personal accident insurance, with coverage for claims at various levels. For staff and students of USP, the University offers group insurance for this purpose, in addition to the possibility of using the University Hospital (HU), in a subsidized relationship with the Polyclinic Hospital (HC) in the city of São Paulo.

As for visitors, staff and students in outreach activities, whether at the head office or itinerancy, are covered by the Personal Accident Coverage Fund (FCAP), set forth in ordinance GR 3.645 dated November 21, 2005. The fund is intended solely for payment of compensation for death, permanent disability and medical and hospital expenses, according to the values and conditions set forth in the Ordinance.

Covered by the fund are: civil servants, contract faculty and students regularly enrolled in USP, exclusively when traveling for University activities; and the external audience on outings or spontaneous visits to cultural activities developed by the Science Station, CIENTEC Park, CEUMA, TUSP, CPC, CINUSP Paulo Emilio, OSUSP, CORALUSP, and USP state Museums.

### ***Final remarks***

The above text was written with the aim of providing an overview of various types of risks that require security measures in a specific type of museum. In particular, the CIENTEC Park presents specific characteristics in relation to other science museums, since it is located in an environmental conservation area, with exhibits outdoors and in historic buildings, and scientific heritage from institutions that occupied and remained in the location for more than seven decades. Its comparison to other museums shows the wealth of possibilities through dissemination of scientific and cultural knowledge by means of the USP Department of Culture and Extension. The need therefore becomes clear to preserve and to make this wealth accessible, which requires specific safety measures for each museum.

### ***Acknowledgments***

Although limited, the operational and administrative technical staff always cooperated fully in all activities for preservation of heritage and security within CIENTEC.

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## Notes

<sup>1</sup> A preliminary version of this text was presented at the “I Seminário de Segurança e Avaliação de Riscos em Museus e Acervos da USP”, organized by the Museum of Science/USP in 2009.

<sup>2</sup> Av. Miguel Stefano, 4.200, Água Funda, CEP 04301-904, São Paulo – SP – BR; site: <http://www.usp.br/cientec/>; [www.parquecientec.usp.br](http://www.parquecientec.usp.br).

<sup>3</sup> As defined by the International Committee of Museums - ICOM/UNESCO, science centers are included in the Museum category.

<sup>4</sup> The University of São Paulo Science and Technology Park project is presented in MANTOVANI, Marta S. M.; MASSAMBANI, Osvaldo. **Ciência e tecnologia no Parque.** São Paulo: São Paulo University Publishing House, 2004a.

<sup>5</sup> The planning, forecasting, restoration and conversion are in MANTOVANI, Marta S. M.; MASSAMBANI, Osvaldo (org.) **CIENTEC Park - Parque de Ciência e Tecnologia da USP: Restauração do Conjunto Arquitetônico de importância histórica para abrigar atividades de difusão da ciência e da tecnologia.** São Paulo: EDUSP, 2004b.

<sup>6</sup> Available at [www.es.com](http://www.es.com). Accessed in Aug. 2002.

<sup>7</sup> As per MANTOVANI, M. S. M.; ROCHA, V. R. da. Jogando com a ciência e o curso de informática para inclusão digital: novos olhares sobre a ciência através do computador. **Revista de Cultura e Extensão**, PRCEU/USP, São Paulo, v. 8, 2012, p. 49-66.

<sup>8</sup> MANTOVANI, M. S. M.; ROCHA, V. R. da. Jogando com a ciência e o curso de informática para inclusão digital: novos olhares sobre a ciência através do computador. **Revista de Cultura e Extensão.**

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