

Water towers in Brazil: a manifesto for their preservation

Torres de água no Brasil: manifesto pela sua preservação

Tanques de agua en Brasil: manifiesto para su preservación

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Abstract

A technological product of the industrial era, the water tower, consolidated itself as a fundamental part of water supply systems, one of the material bases for the existence and operation of cities. Still, despite their undeniable importance, the study of water towers has been relegated to academia, creating a gap that needs to be bridged. Starting from a bibliographic review of the rare research conducted on the subject and bringing as a contribution to the discussion a bibliography on the investigation



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and preservation of the architectural legacy of industrialization, this article¹, in addition to being a manifesto in favor of the recognition of water towers as architecture, the urgency of researching these infrastructures and the importance of inventories to catalog them, has as its primary objective the establishment of preliminary guidelines for the preservation of water towers as architectural heritage. Water towers, aside from their function, technical and aesthetic qualities, and historical importance, are, first and foremost, material testimonies of our civilization that must be preserved.

Keywords: Water Tower; Infrastructure; Architectural Heritage; Inventory; Preservation.

Resumo

Produto tecnológico da era industrial, as torres de água se consolidaram como parte fundamental dos sistemas de abastecimento de água, uma das bases materiais para a existência e o funcionamento das cidades. No entanto, apesar de sua inegável importância, o estudo das torres de água tem sido relegado em trabalhos acadêmicos, gerando uma lacuna que precisa ser preenchida. Partindo de uma revisão bibliográfica das raras pesquisas realizadas sobre o tema e trazendo como contribuição para a discussão uma bibliografia sobre a investigação e a preservação do patrimônio arquitetônico da industrialização, este artigo, além de ser um manifesto em favor do reconhecimento das torres de água como arquitetura, da urgência de se conduzir pesquisas sobre essas infraestruturas, da importância de inventários para sua catalogação, tem como objetivo principal estabelecer diretrizes preliminares para a a preservação das torres de água como patrimônio arquitetônico. As torres de água, para além de sua função, de suas qualidades técnicas, estéticas e importância histórica, são, sobretudo, testemunhos materiais de nossa civilização que devem ser preservados.

Palavras-chave: Torre de Água; Infraestrutura; Patrimônio Arquitetônico; Inventário; Preservação.

Resumen

Producto tecnológico de la era industrial, las torres de agua se han consolidado como parte fundamental de los sistemas de abastecimiento de agua, una de las bases materiales para la existencia y funcionamiento de las ciudades. Sin embargo, a pesar de su innegable importancia, el estudio de las torres de agua ha quedado relegado a los estudios académicos, creando un vacío que es necesario llenar. Partiendo de una revisión bibliográfica de las escasas investigaciones realizadas sobre el tema y trayendo como aporte a la discusión una bibliografía sobre la investigación y preservación

¹ This article is part of the ongoing doctoral research entitled *"Water Towers in São Paulo: Reflections and Proposals"*, developed at FAUUSP, under the guidance of Professor Francisco Spadoni, PhD.



del patrimonio arquitectónico de la industrialización, este artículo, además de ser un manifiesto a favor del reconocimiento de las torres de agua como arquitectura, la urgencia de realizar investigaciones sobre estas infraestructuras, la importancia de los inventarios para su catalogación, tiene como principal objetivo establecer pautas preliminares para la conservación de las torres de agua como patrimonio arquitectónico. Las torres de agua, además de su función, sus cualidades técnicas y estéticas y su importancia histórica, son, ante todo, testimonios materiales de nuestra civilización que deben ser preservados.

Palabras clave: Torres de Agua; Infraestructura; Patrimonio Arquitectónico; Inventario; Preservación.

INTRODUCTION

hough the use of elevated reservoirs has existed in various forms since antiquity, the modern use of water towers in public water supply systems was only established in the mid-19th century due to a combination of social and technical factors. The Industrial Revolution, which began in England in the mid-1700s, quickly spread to several European countries and, in addition to resulting in the mechanization of manufacturing systems and an increase in industrial production, gave way to a dizzying growth of cities and urban populations, driving up the demand for potable water significantly.

In a short period, a large number of industrial cities in England, as well as major European cities like Hamburg (1848), Berlin (1852), and Paris (1865), began implementing modern centralized supply systems, thus attending the populations' growing demand for potable water. In Brazil, in the late 19th century, the cities of Pelotas (1871), Rio Grande (1872), Rio de Janeiro (1876), and São Paulo (1876) began implementing their centralized water supply systems. Advances in iron manufacturing, the development of steam-powered hydraulic pumps, and new plumbing systems created the technical and material bases for implementing modern water supply systems, consolidating themselves as one of the essential infrastructures for the existence of industrial, modern, and contemporary cities.

A technological product of the industrial era, centralized water supply systems spread rapidly throughout the world as late as the 19th century. Like many contemporary ones, these systems required water towers with large reservoirs positioned above the consumption areas to compensate for variations in pressure and water consumption (Werth, 1971), thus consolidating the water tower as a fundamental part of their operation.



In addition to their function in cities, water towers are architectural objects, and many of them can be considered part of the history of architecture. However, despite their historical value, undeniable usefulness, and importance in the functioning of cities, the study of water towers as architectural objects, especially in Brazil, has been relegated to academic research and work, thus generating a gap that needs to be filled.



Figure 1: Water tower at Largo dos Remédios, Manaus (1884), demolished. Source: George Huebner / Instituto Moreira Salles Collection (public domain).

Starting from a bibliographical review of the few studies conducted on the subject and introducing as a contribution to the discussion a bibliography in favor of the need to investigate and preserve the architectural heritage of industrialization, this article, in addition to being a manifesto in favor of the recognition of water towers as architecture, the urgency of initiating and conducting research on these infrastructures and the importance of compiling inventories to catalog them, has as its primary objective the establishment of preliminary guidelines for the preservation of water towers as architectural heritage. Aside from their function, technical and aesthetic qualities, and historical importance, water towers are material witnesses to our civilization that should be preserved overall.

Water Towers as Architecture

The absence of comprehensive studies on water towers in the field of Architecture can be partly explained by the fact that their design was initially entrusted to the same engineers who developed the projects for water supply systems and the participation of architects in these projects, if any, was limited to the design of the "external envelope" of these constructions (Genicot, 1991; Andrade, 2019).



Since constructing the first water towers for public supply around 1850, engineers have tried to find the most efficient water tower tanks. The great diversity of tank typologies that exist today is the result of the technological development of construction materials (steel in the 19th century and reinforced concrete in the early 20th century) and the search for an "ideal format" of the tank that would guarantee the lowest consumption of material per cubic meter of stored water. Figure 2 presents a table with the main types of tanks used in water towers.

However, the design and construction of water towers cannot be considered a task exclusive to engineering. Many renowned architects, using existing tank typologies or creating innovative typologies, have conceived designs for water towers. We can cite Joseph Maria Olbrich, Hans Poelzig, Walter Gropius and Adolf Meyer, Auguste Perret, Le Corbusier, Mart Stam, Jørn Utzon, Eero Saarinen, Alvar Aalto, Frei Otto, Paulo Mendes da Rocha, Christian de Portzamparc and Álvaro Siza Vieira, to name but a few (Andrade, 2019).



Figure 2: Table of Tank Typologies. Source: Andrade, 2019.

Although water towers are primarily infrastructure and are often considered structures that fit somewhere between the work of engineers and architects, their shape and appearance are not the isolated results of strictly technical considerations and circumstances (Mevius, 1985), production of machinery or equipment, hydroelectric dams or water towers inevitably requires formal resources based on a materiality and this, at one point or another, ends up manifesting in aesthetic and symbolic appreciation. In addition to their function as infrastructure, buildings like water towers can also provoke discussions of other issues inherent to architecture, such as beauty or truth, serving as a potential theme for research on the "conflict" between the useful and the beautiful, form and function (Genicot, 1991). Many of the design strategies used by architects and engineers in the challenge of designing these infrastructures transcend the programmatic and technical functions of the object, also contributing to procedures inherent to the architectural practice itself, such as the exploration of form as a means of expression, a generator of aesthetic experience. Hannah Arendt makes an essential contribution in this regard:

> To be sure, an ordinary use object is not and should not be intended to be beautiful; yet whatever has a shape at all and is seen cannot help being either beautiful, ugly, or something in-between. Everything that is, must appear, and nothing can appear without a shape of its own; hence there is in fact no thing that does not in some way transcend its functional use, and its transcendence, its beauty or ugliness, is identical with appearing publicly and being seen (Arendt, 2017, p. 215).

Every construction that intends to strictly attend to a specific agenda, aiming at a particular function and meeting the requisites of technique, requires a suitable project for its realization. Conventional design themes such as a house, a school, a commercial building, a museum, or a park are practically synonymous with Architecture. We propose that water towers should enjoy the same status. Still, throughout the history of architecture, infrastructure, and utilitarian buildings have always been treated as minor structures.

In the essay *Baustile and Wassertürm*, Mevius (1985) analyzes the transformations that occurred in the architecture of German water towers from the mid-19th to the mid-20th century and points out that it is correct to say that structures as impressive as the water towers were designed and constructed attuned to the architectural and technological paradigms of their time. According to this same rationale, it seems correct to affirm that water towers are not buildings with their architecture but can instead be understood as part of Architecture since they accompany its development from the pre-modern period to the present day and can be studied and understood with the same instruments that we use to analyze the Architecture of conventional repertoire.



Architecture can be understood as an autonomous discipline, but it can conform to contributions from other areas of knowledge, be they technical or humanistic. Infrastructures are one such area, and it is legitimate to admit that, in the architecture of infrastructures, we find valuable sources for studying the roots of modern and contemporary architecture.

Though the approximation of the fields has been historically contentious, in recent times, they have merged on both ends: architecture as infrastructure and viceversa. The architecture of infrastructures can improve its forms and constructive diligence and incorporate aesthetic concerns. Still, if we eliminate its functional and practical bases, it loses its technological accuracy and becomes distorted, losing its vigor and authenticity.

Research into the Architecture of Infrastructure can offer lessons in rationality, ingenuity, economy, performance, and beauty, lessons of great importance for the training of today's architects. However, objective and systematic studies of the architecture of infrastructures -- and the architecture of water towers, specifically -- that allow us to extract such lessons are yet to be conducted.

In his development of one of the most recent studies on water towers in Britain, Barton (2007) points out the almost complete lack of books on water towers, commenting that even books on "towers" feature all possible types of towers except water towers, and finishes by saying: *"architecture books ignore them."*

Though quite flimsy, the study of water towers is not entirely non-existent. Research developed by Werth (1971) and Merkl (1985) in Germany, Houwink (1973) and Veen (1989) in the Netherlands, Van Craenenbroeck (1991) in Belgium, and Barton (2007) in Great Britain demonstrate that some serious, systematic studies on the water towers of these countries have already been executed.

In Brazil, the bibliography on Brazilian Architecture has gradually become richer and at an increasingly accelerated pace. But very little has been written or observed when it comes to the architecture of infrastructures and, in our case, the architecture of water towers. Aside from a few excellent works in monographs of Brazilian architecture, such as the towers designed by Luiz Nunes (1937), Carlos Frederico Ferreira (1942), Lucjan Korngold (1953), Severiano Porto (1972) and Paulo Mendes da Rocha (1985), and a few articles that address the topic superficially, there still has not been a broad and systematic study on the architecture of Brazil's water towers.²

As an example of the marginalization to which documentation of our water towers is subjected, we can cite the case of the Water Tower of the Sé Cathedral of Olinda (1937), a project by architect Luiz Nunes, a symbolic and pioneering work in Brazil that incorporates the principles of the European rationalist movement, and its

² For more details on these works, see Andrade (2019).



citation in classic books in the historiography of Brazilian architecture:

In Goodwin's publication (1943), just one photo of the project is presented without any mention of the architect's name. Mindlin's book (1956) features only one image of the project in its opening pages, without dedicating an exclusive page to the project as it does with the others, and Bruand (2002) even having a topic entitled *"Luiz Nunes and the Recife Movement (1934-1937)"* only cites the water tower project as a footnote.

The series of articles "A Arquitetura das Torres de Água" ["The Architecture of Water Towers"] (Netto, 1960) published in Revista D.A.E., between the years 1960 and 1973, is one of the rare contributions to the study of the theme in Brazil. This series of articles presents historic European water towers while offering an overview of the design trends for these facilities in Brazil at their publication. Though a precursor to the study of the theme and with ample use of photography, they feature little or no complementary information about each project.

Last but not least, it is essential to place the water towers within a broader context, also understood as part of the architectural heritage of industrialization. The water tower is a product of the industrial city of the 19th century, developed to meet the needs of cities and urban populations in rapid growth, which transformed over the 19th and 20th centuries until taking on its current characteristics (Mevius, 1985). Kühl (2008) also shares this understanding by pointing out that the "monuments to industrialization" are not only factory production units but also all those buildings resulting from the industrialization process, such as railway buildings, factories, viaducts, exhibition halls, and water towers.



Figure 3: Hydraulic Tower, Rio Grande (1876). Source: https://www.flickr.com/fotos/ fotosantigasrs/12820558564. Accessed: Feb. 7, 2023 (public domain).



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Figure 4: São Brás Water Tower, Belém (1885). Source: Filipe Fidanza / Álbum do Pará em 1899 (public domain).

As such, given the virtual nonexistence of specific studies on water towers and considering their historical and architectural significance, there is an urgent need for more in-depth studies on these pieces of infrastructure, especially in Brazil, where very little about this matter is documented and examined, and where this architectural heritage is at risk.

Inventory and preservation

In Brazil, it is necessary to complete some unavoidable tasks to understand our water towers better and preserve this largely neglected architectural heritage. First, we need to conduct a critical inventory of our water towers, relating it to the historical, economic, social, and technological context in which the works were produced, investigating the particular characteristics that differentiate or link them to their European origins, identifying the materials, technologies, and



typologies prevalent in their construction and seeking, above all, to analyze the influence of the architectural trends operating at the time of their conception.

An inventory of this nature is a vast, complex, and specialized task, not only considering the size of Brazil's territory, the probable differences in terms of availability of information on each of the works, but, mainly, the large number of examples awaiting their due recognition and cataloging. Taking as an example the state of São Paulo and considering only water towers for public supply, we conducted a survey based on information from *Altas Águas* (Brazil, 2021), which showed that 77% of the municipalities in São Paulo have towers in their networks. In other words, there are at least 498 buildings. The actual number is much higher. Many municipalities have more than one tower in their systems. In the city of São Paulo alone, there are about 30 towers; in Bauru, there are 26; in Araras, there are 21, to name a few examples.

Given the vast universe of Brazilian water towers, surveying and cataloging them must be a multidisciplinary, collective, collaborative, and cumulative endeavor, a joint effort of architects, students, historians, and other interested professionals. Though, ideally, an inventory of this nature should be conducted by heritage agencies, the participation of academia in this process is essential, offering contributions to the inventory through projects of scientific initiation and postgraduate research.

Cataloging should give priority to examples that are part of public water supply systems, inventorying and investigating the various manifestations of these infrastructures in each of the regions of the country to subsequently catalog works built for other purposes (industrial processes, individualized supply of hospitals, schools, public buildings, and others), whose historical, architectural significance or technical merit may be relevant.

Considering the lack of studies and publications on the subject in Brazil, it is reasonable to assume that inventories of this nature can contribute to a better understanding of this matter and mainly contribute to preserving the works that deserve to be maintained. This brings us to the second task: a selection of "what" to preserve and, most notably, "why" to preserve it.

As advocated by Beatriz Mugayar Kühl, the preservation of architectural heritage aims to ensure the right to history and memory as a human and social need:

Preserving means allowing, encouraging and ensuring that various types of testimony to human creations, current and past, exist and coexist, offering a broad instrument for the understanding and apprehension of reality, thus providing comprehensive means for it to adapt and build the future (Kühl, 2008, p. 282).

Still, Kühl argues that the preservation of architectural heritage means "ensuring diversity and combating the intolerance that annihilates other forms of expression" and defends this preservation "as a form of protest against the current situation that threatens relevant forms of human activity," an argument that fits perfectly with the case of the water towers, a type of construction whose existence has been ignored by the history of Brazilian architecture.



Figure 5: Paes de Carvalho Water Tower, Belém (1908), demolished in 1965. Source: Revista de Belém n°1. Available at: https://ufpadoispontozero.wordpress.com. Access on: Feb. 23, 2023 (public domain).



CADERNOS DE PÓS-GRADUAÇÃO EM ARQUITETURA E URBANISMO v. 24 n. 1 jan./jun. 2024 • ISSN 1809-4120 | http://editorarevistas.mackenzie.br/index.php/cpgau DOI 10.5935/cadernospos.v24n1p290-307 Indeed, not everything should be preserved; much on the contrary. We aren't advocating here for the unrestricted preservation of all of Brazil's water towers. We are advocating for a sensible, meticulous identification of the examples that deserve to be effectively preserved, making the production of a comprehensive inventory of these works, therefore, indispensable.

Although the landmarking process currently protects some of Brazil's water towers, these works are preserved due to their value as architecture, their historical value, or the symbolic and affective values that the population attributes to them and not because they are representative examples of this type of construction.

For the preservation of the water towers, a sensible and careful selection of the specimens that can best illustrate the various typologies, materials, and languages of the works must be made, documenting the morphological and constructive transformations of Brazil's water towers over time and considering, above all, the historical importance of the specimens. The task of selecting them should not be an isolated, individual undertaking. It should be a joint, multidisciplinary operation involving a broad debate by architects, historians, and other specialists, who should also initially define the criteria to be adopted for the selection of the specimens to be preserved.

According to Kühl (2021), the preservation of historical heritage, in addition to inventory, registration, and legal protection, also involves actions of patrimonial education and interventions in the properties, the latter in the form of maintenance, conservation, and restoration efforts.

Given the diversity of manifestations and operational status of each water tower, the effort to preserve them is a complex subject whose analysis and deeper reflection exceed the limits of this article. Indeed, the actions necessary to safeguard operational towers must differ from those employed for decommissioned towers, given that operational towers must continue to fulfill the function they perform in cities, regardless of whether or not there is a need for their preservation. However, deactivated water towers introduce the possibility of incorporating a new use to the work, enhancing the potential for its preservation when the latter is possible and necessary, and avoiding its demolition by disuse in the worst-case scenario.

Therefore, to establish some preliminary guidelines for actions to preserve these works, we propose that the towers initially be classified and defined by the combination of the following factors:

a) The tower's operational status: operational or decommissioned;

b) Need for preservation: yes or no;

c) Possibility of changing the tower's use: yes or no.



With the combination of these factors, the towers will thus be classified into **five groups**, listed below, and the preliminary guidelines for action are described further:

Group 1: Operational tower, preserved;

Group 2: Operational tower, not preserved;

Group 3: Decommissioned tower, preserved;

Group 4: Decommissioned tower, preserved, with new use;

Group 5: Decommissioned tower, not preserved.

For the towers in **group 1**, in addition to the necessary preservation guaranteed by a legal mechanism, conservation and maintenance operations must be provided to guarantee the operation and preservation of their architectural qualities and characteristics and, only as a last resort, restoration operations which must always be executed by specialized professionals, accompanied by specific studies and projects for this purpose, aiming to preserve the integrity of the work. Kühl (2008) presents the fundamental differences between the maintenance, conservation, and restoration operations that are essential for the survival of protected assets, itemizes the principles that should guide each of these operations, and also warns of the disastrous and criminal results of poorly executed conservation and restoration interventions in historical assets.

For **group 2**, conservation and maintenance are all proposed to guarantee the operation and quality of the water supply, promoting a lengthy lifespan for the building and avoiding premature and unnecessary replacements or demolitions.

Some towers of great historical value and cultural significance cannot be adapted to any other use than the one they were designed for. Once decommissioned and preserved, they become historical monuments, and, as Riegl states (2014), we attribute the value of memory to them. A typical case is that of the water tower of Ceilândia, in Brazil's Federal District, which, after being decommissioned, was listed as architectural heritage at the request of the population, which considers it an icon of the memory of the city's construction. Here, in **group 3**, the same guidelines as in group 1 are valid but with one aggravating factor: an unused building continues to have maintenance costs, so it is necessary to provide mechanisms to finance its preservation. Whenever possible, it is essential to work with the idea of new uses in these buildings, intending to contribute financially to their maintenance and conservation.

For many historically decommissioned water towers, it's possible to find a new use that will enhance the work's potential and is perfectly compatible with the historical construction without incurring the loss of the essential architectural characteristics



that make it valuable. Here, in **group 4**, in addition to applying the guidelines of group 1, we must consider that any changes in use must be implemented through specific studies and projects developed by a multidisciplinary and specialized professional team. The project for changing its use must be respectful of the formal and material aspects of the work, respecting the principle of distinguishability in the interventions and, above all, avoiding interventions that may cause the work to become disfigured.

Finally, in **group 5**, we consider one more situation: once it is decided that a deactivated water tower will not be preserved, its demolition should always be regarded as a last resort. Structures such as water towers can undoubtedly be used for other purposes as long as a suitable project is developed. Anne Lacaton, of the studio Lacaton & Vassal, known for the *"never demolish"* premise and the notion of incorporating economic, environmental, and social sustainability in her projects, makes an essential contribution in this regard:

"Never demolish, never remove or replace, always add, transform, and reuse! Demolishing is a decision of easiness and short-term. It is a waste of many things – a waste of energy, a waste of material and a waste of history. Moreover, it has a very negative social impact. For us, it is an act of violence" (apud Wainwright, 2022).

Recently, many water towers in Europe have been decommissioned to be given a second destination. Small towers have been converted to single-family residences, while gigantic towers house museums, cultural centers, and hotels. One of the water towers³ in Cologne, Germany (1872), once the largest tower in Europe with 3,683 cubic meters of water capacity, was converted into a hotel in 1990.

Although, in most cases, a water tower can be more easily preserved if it continues to fulfill the function for which it was initially designed, it is urgent and necessary to find new possible uses for decommissioned water towers as an alternative to their demolition, even if there's no interest in their preservation as historical and architectural heritage.

FINAL CONSIDERATIONS

The future of water towers is uncertain. Currently, both in large industrial sectors and centralized water supply systems, in cases where it is necessary to guarantee pressures in the hydraulic networks, it is increasingly common to use pressurized water systems, technical alternatives that, together with supported reservoirs, have proven more economical than the construction of water towers.

³ Photo of the Cologne water tower converted into a hotel. Available at: https://www.uniqhotels.com/hotel-im-wasserturm. Access on: Feb. 7, 2023.



Aside from the water towers that will continue to operate in centralized water supply networks, it is likely that the number of decommissioned water towers will increase in coming years as a result of the mergers of supply networks in big cities. Currently, the interrelation of supply networks has become increasingly frequent,



Figure 6: The Av. Tiradentes Water Tower gushing water after bombing (1924). Source: Gustavo Prugner / Instituto Moreira Salles Collection (public domain).



CADERNOS DE PÓS-GRADUAÇÃO EM ARQUITETURA E URBANISMO v. 24 n. 1 jan./jun. 2024 • ISSN 1809-4120 | http://editorarevistas.mackenzie.br/index.php/cpgau DOI 10.5935/cadernospos.v24n1p290-307 an alternative to guarantee that a given area of the city can be supplied from different sources, thus avoiding problems of water shortages due to the recent water crises that have affected cities. The water tower, which may be present in a small network, usually does not fit into the general supply system and loses its function (Veen, 1989).

In addition, many 19th and early 20th-century water towers have already been demolished in all parts of the world. Many others will disappear in the coming years, replaced by more efficient systems or new towers with excellent storage and operation capacity. In just over a century, the public supply system of the city of São Paulo has already had six of its water towers demolished, and two others, currently deactivated, have an uncertain future as legal preservation mechanisms do not protect them.

Some of these demolished towers were historical monuments that cannot be recovered. Other demolitions could undoubtedly have been avoided, with the structures converted to be given new, useful societal functions. Inventorying the Brazilian water towers also has this objective: to recover the history of works that were lost, such as the tower of Avenida Tiradentes (1907), possibly the first water tower in the city of São Paulo and responsible for supplying the neighborhoods of Luz and Bom Retiro (Whitaker, 1946). During the 1924 Paulista Uprising, the bombings seriously damaged the tower, and as a result of the damage suffered, it was eventually demolished. The history of this tower, its authors, and the type of construction are still enigmas to be solved. Aside from the photo documenting its destruction, little is known about its existence (Figure 6).

Aside from their function in contemporary cities, technical and aesthetic qualities, and historical importance, water towers are material witnesses to our civilization that should be preserved. Thus, it is urgent to begin producing the research and inventories that will allow us to understand better how water tower architecture manifested in Brazil and provide subsidies for their preservation.

In our country, where very little is documented about the history of our water towers and where this architectural heritage is at serious risk, efforts must be undertaken to prevent the "water tower" building from disappearing as part of our architectural heritage.

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