

CONVERSION OF WATER TOWERS – AN INSTRUMENT FOR CONSERVING HERITAGE ASSETS

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Abstract. Water towers are symbolical landmarks that refer to the industrialization. The oldest water towers are technical and industrial assets whose current and future evolution is a sensitive matter as a result of the economic context that brought about the closing of numerous industrial enterprises and abandoning infrastructure assets, including water towers. Some water towers were included on the national cultural-heritage lists across the world, thanks to the manifold values they incorporate (technological, historical, architectural, esthetical, among others). In this context, it has become necessary to convert them, with the twofold purpose of conserving them and assigning them a new function, for the local community members. Although there are numerous models for good practice in the conversion of water towers in several European countries, in Romania their reuse is a difficult process, most of the time burdened by shortcomings of legislation or lack of financial support. The study's main purpose is to present reasons for the conversion of water towers and to highlight several good practice models, as well as to present several water towers with a high potential for conversion.

Key words: technical and industrial heritage, symbolic value, conservation

1. Introduction

The present study focuses on the analysis of water towers from a cultural perspective, highlighting on the one hand their quality as cultural assets, and on the other hand the multiple opportunities for their conversion.

Reusing water towers is a form of conserving, as well as capitalizing in an improved manner, frequently meaning an alternative course of action to demolishing them, even more so as numerous water towers are out of service and rated as historical monuments.

During the Roman Empire, the word *castellum* meant water-tanks (at ground level or slightly above ground level), fed by an aqueduct, and the phrase *water tower* is found in French literature as early as 1704. Old water towers are considered cultural goods, with manifold significances: historical, architectural, technological and, therefore, cultural. They are frequently included on the national-heritage lists, across the world.

With the birth of architecture and engineering, the imagination and inventiveness of architects and engineers combined to create water-tower models that stand out in terms of particular architectural contours, defined by their structure and technical installations (Popelová, 2007).

One also remarks the evolution of the technical features from one age in history to the next (mathematical techniques used so as to optimize the water used in cooling towers (Gololo and Majozi, 2013), designing various systems to cool the water used in various economic enterprises (Rubio-Castro, 2013), reusing water in cooling towers (Guo and Liu, 2013; Carvalho *et al.*, 2010).

Water towers are considered industrial-heritage assets (Nijhof, 1993; Gábor-Szabó, 2010), and they are included in the category "service industries mainly water" (Industrial Heritage Review of County Clare, 2003). According to the definition of the industrial heritage as created by the International Committee for the Conservation of the Technical Heritage (TICCIH) it consists of "remains of industrial culture which are of historical, technological, social, architectural and scientific value". Water towers are included in the same category together with the workshops, warehouses

and electric plants (the Charter for the Industrial Heritage, 2003).

Water towers are evidence as to the development of industry, both in urban and rural areas. Most water towers are associated with railway stations, as it is a known fact that railway transport has had a significant contribution to the development of industry. The importance of supplying water to the railway transport system was initially linked to the fact that it increasingly required the construction of the economically executable and maintainable elevated water tanks because the operation of the fully steam driven line was economical (Gábor-Szabó, 2009). The stopping points enabling the refilling of the locomotives' tenders with water were called water stations. Their distribution along the railway lines were elaborated taking the most unfavourable water consumption into account (Gábor-Szabó, 2009:67).

At the same time, water towers were also used to supply industrial areas, as water was needed in manufacturing processes, and they are the oldest forms of water storage built to supply major cities (Tartarini, 2005).

A special category of water towers used to consist, in the past, of firemen's watchtowers, most of them being the result of conversions of a cultural nature, and with a limited number preserving their original purpose up to the present time.

The shape of water towers has varied over time, and so did the materials used in their construction: during 1880-1900 – prototypes with iron water tanks; 1900-1920 – the first concrete water towers; 1920-1940 – the development of massive concrete water towers; 1940-1970 – polygonal water towers; 1960-1980 – mushroom-shaped towers;

1970-1990 – conical water towers. The shape was linked to the respective purpose of each water tower.

From the point of view of the *construction materials* used, we can identify, in general, several categories of water towers:

- built in *lime and brick* – typically, in the past, hard rock (lime) was predominantly used in the construction of water towers; brick was a construction material predominantly used for industrial buildings in the 19th century; they stand out because of the particular construction technique resulting from the way rocks were joined, which provided water towers with a high degree of resilience; most water towers were rectangular shaped and they were also used as fortifications;
- built in *reinforced concrete* – typical for modern water towers, first built starting the mid-20th century; they use a cylindrical-truncated cone tank, with a cupola supported by several pillars; the cupola could be either spherical or conical (mention must be made of the water towers in Portugal built in Hennebique's reinforced concrete) (Tavares, 2006).
- built in *steel* – it features the benefit of being an elastic material that can be welded, but it is vulnerable to corrosion; the tanks are spherical or ellipsoidal shaped, connected by a truncated cone to a cylindrical roller, which continues with a truncated cone that provides the overall structure with resistance to the wind.

From the point of view of *geometrical shape* (Fig. 1), water towers are divided into the following categories: a) hyperbolic; b) conical c) column; d) mushroom; e) standard; f) corbelling; g) hourglass.

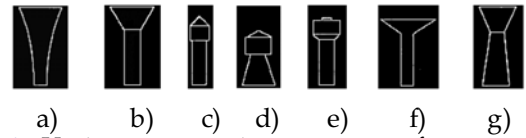


Fig. 1. Various geometric water-tower forms

Source: Debled and Leroux (2005)

A classification according to the criterion of the *evolution* of water towers conducted by the Architecture, Urbanism and Environment Council of the Nord Department, France, takes into consideration the following generations:

- a) *the latter half of the 18th century*: water towers have a tower-like look, which easily reminds one of medieval constructions. The tank is made of steel plates, hollow at their lower ends, affixed on a bigger masonry structure. The tank is sometimes masked by a plate and covered;
- b) *early 20th century* – the “champagne-cork”-shaped water tower, whose wide tank is on top of a narrower pedestal. The idea of the usefulness of a tank emerged immediately after, which led to the creation of the Intze tank in the 1880s (named after the engineer who invented it); it concentrates its weight on a cupola narrower than the tank; the shapes or the new type are multiple: steel or reinforced-concrete tanks, brick or solid or perforated pedestals etc.; many water towers in the early 20th century use this system;
- c) *mid-20th century* – starting in the 1940s, concerns linked to the architecture and esthetics of water towers meant that attempts to disguise the structure into an exterior packaging became increasingly numerous;
- d) *late 20th century* – mushroom-shaped water towers became very popular in the 1960s-1970s.

In time, in order to prevent their remaining mere relics of technology, water towers were given a new function, but they did not necessarily always undergo a conversion: foundation for

relay antennas, monumental paintings or lighting (Debled and Leroux, 2005).

At the international level, we can identify several categories of water towers conversion, grouped in 4 types: **cultural activities; tourism; creative and different services; residential destinations**. In general, if water towers underwent a conversion, a quite frequent instance is public buildings – living quarters, hotels, restaurants etc.: a) a concrete-built water tower in the Belgian city of Anvers was converted into a block of flats, with six floors; b) a water tower built in 1923 in Suffolk, England (Thorpeness) was converted in the late 1980s into the *House in the Clouds* hotel; c) a water tower in Vandoeuvre-lès-Nancy (France) was converted into apartments.

2. Methodology

Several water towers in Romania and other European countries (Hungary, Bulgaria, Germany, France, Portugal, Italy, Czech Republic) were inventoried by means of several field trips conducted during 2011-2013. Photographs of each water tower were also taken in situ. In addition to fieldwork, research also included fact-finding and archival work, so as to capture the complexity of water towers from the technological, architectural and historical perspective.

Research also involved the analysis of a significant volume of data: obtained either in the wake of field observations, mapping, or from other types of sources: cartographical, the extant databases (ESRI - GIS) of various public institutions (city hall, the Ministry of Culture and the National Heritage, the National Heritage Institute).

The data collected on the history of the water towers were initially processed synthetically into observation records,

using the monument brief drawn by the members of the National Society of Water Towers in Holland as the model. Among the main identification data the Dutch specialists have used when assessing and analyzing water towers, one may mention: data on the construction (architect/builder, current state: used/unused, physical state, suggestions for reuse), data on the architecture of the water tower (shape, construction materials, height, other information: comparisons against other similar towers, specific technical details: for instance, tank capacity), and so on (Nijhof, 1993).

Concerning the water towers in Romania that served as case studies, the inventory included both those rated as historical monuments, and those with a historical and technological value. Those in the latter group were inventoried and analyzed with the purpose of later on suggesting their inclusion on the list of historical monuments. Special attention was paid to those water towers that have the potential for a conversion.

Case studies from various European countries were also selected, so as to present a series of models for good practice in the conversion of water towers.

3. Results

Romania is characterized by a diversity of industrial architectural heritage assets dating back to various phases in history (Merciu *et al.*, 2012a), water towers standing out among them. Various water towers that stand out because of their peculiar architecture have been selected for this study, many of them rated as historical monuments. The 2010 list of historical monuments drawn by the Ministry of Culture and the National Heritage includes the following water towers (Table 1).

Table 1. The water towers labeled in the local and national heritage

Name of historical monument and its identification number	Date of construction	Location	New reuse
Fire Watchtower B-II-m-B-18722	1890-1891	Bucharest	Romanian Firemen's Museum
The Vlad Ţepeş Water tower B-II-m-B-21011	1906	Bucharest	The National Office for Heroes Memory
Water tower CL-II-m-B-14695	early 20 th century	Oltenița city	Art museum
Water towers TM-II-m-A-06122 TM-II-m-A-06152	1912-1914	Timișoara city	-
Water tower BR-II-m-B-02104	1914	Brăila city	cultural and scientific center
water tower: AR-II-m-B-00492	1896	Arad city	"Water tower" art gallery
Fire Watchtower CJ-II-m-A-07242.03 Mur	19 th century	Cluj Napoca city	Firemen's Museum (currently closed)
Fire Watchtower SM-II-m-A-05233	1903-1904	Satu Mare city	tourist attraction
Water tower MH-II-m-B-10168	1912-1915	Drobeta Turnu Severin city	exhibition space and an art gallery
Tobacco Factory water tower CV-II-m-A-13107.03	1902-1910	Sfântu Gheorghe city	-
Water tower IF-II-m-A-15257.04 (inside the Știrbey Palace complex)	early 20 th century	Buftea city	tourist attraction
water tower inside the manor of Gheorghe Grigore Cantacuzino - the Nabob PH-II-m-A-16490.02	1910-1916	Florești (Prahova county)	-
Water tower on the premises of the Eastern Railway Station TR-II-m-B-14424	the early 20 th century	Roșiori de Vede, (Teleorman county)	-
Water tower TR-II-m-B-14468	early 20 th century	Suhaia village, omonime commune Teleorman county	-
Water tower VS-II-m-B-06769	1931	Buhăiești village, Vulturești commune, Vaslui county	-
Water tower TR-II-m-B-14424	1915	Turnu Măgurele city	-
Ranchina water tower of Grebla power station CS-II-m-A-10939.02	1910	Resita City, Caras-Severin county	-
Water tower of furnace CS-II-m-B-11037	1719	Bocsa city, Caras-Severin county	-
Water tower CT-II-m-B-02865.02 (inside of Basarabi railway station)	early 20 th century	Murtfatlar Constanța county	-
Ruins of the water tower OT-II-m-B-08629	XIX th century	Slatina city	-
Water tower OT-II-m-B-08992.06	early 20 th century	Poiana village, Radomiresti commune	-

At the national level, even if the conversion process is at the beginning, the few realized projects can become examples of success for future strategies of development.

There are a few water towers that have already been converted or are undergoing functional conversions into: cultural activities; tourism; cultural activities and tourism; other services. In addition to these categories, also, the authors have identified the category of technical and industrial water towers with the potential for a conversion.

3.1. Cultural activities

The water tower in the Pantelimon borough (Bucharest) (Fig. 2) supplies the Romanian Drapery and it used to be up to a short time ago a commonplace tower that failed to stand out, in terms of either shape or manner of construction (it is built in reinforce concrete and column-shaped). The members of the “Make a point” cultural association, made up of several enterprising young architects, have come up with the idea of ending the water tower’s anonymity and suggested the launching of a contest consisting in the creation of several themes for the painting of the upper tower. After the contest was launched, the suggestions came in quick succession, and various themes were recommended, each linked to some element that would refer to the industrial context or to the tower’s function (from a green-coloured drape, in remembrance of the time of the old drapery – the idea that won the competition – to capturing the typical commotion of a big city, to depicting the system supplying water to the population, to drawing a bookshelf, deemed an opportunity to direct attention to the cultural role of books, among others). After the winner of the

competition was selected by a means of the public’s vote, the theme was transposed on the top of the water tower, thus converting it into an art tower.



Fig. 2. The water tower in the Pantelimon (Bucharest) borough before and after painting

When painting the top of the tower was completed – with the financial support of a bank – the painting was covered, and it was revealed to the public on New Year’s Eve, 2012. The idea to transform it into an art tower was not limited to painting the tip, as it involves a future refurbishing of the interior with the goal of hosting concerts, shows, film screenings or exhibitions.

The goal of the action to transform the commonplace water tower into an art tower was, on the one hand, getting the borough residents into the campaign to identify and cherish the symbolic elements of the local community, and on the other hand to draw attention to an industrial-heritage asset that serves as a witness to the presence of the industrial enterprise active ever since 1925. The tower will continue to serve the drapery, but it will also become one of the cultural attractions of the city, and of a borough not so rich in cultural attractions. The art tower will become the borough’s main tourist attraction. In addition, in order to ease visiting it, a ladder will be installed around the tower, which visitors would be able to climb to the top for a grand view of the city.

The water tower in Arad entered service in 1896 with the goal of supplying the city with water and services as a firewatch tower. At the time of its construction, it was the tallest building in town (35 m). The water tower was used to supply water to the city until 1956. Since 1990 the water tower has been private property, hosting the "Water tower" art gallery (a permanent water-themed exhibition) and other themed and art exhibitions.

The water tower in Iași, located close to the busiest pedestrian walkway in Iași, that is the Main Railway Station borough, underwent a conversion over a one-year span, as part of an urban regeneration project called "Our Tower".

The conversion began in 2011, when a Iași team of architects won a competition, with a US\$ 20,000 prize, offered by a soft drinks producer, to capitalize on the building, at the time in an advanced state of deterioration.

The conversion, achieved by means of the consolidation and modernization of the water tower, was completed in 2012, and the results of the project consist in inscribing on the façade a phrase urging to the development of the community spirit, summarized in three verbs: "love", "dare" and "build". This intervention is an example of care for the public space, where identity of the place tries to endure and to become increasingly visible, both literally (the decision was made to lit up the words at night), and figuratively.

Although the intervention in the case of the water tower in Iași did not have a purely cultural role, but rather the role of raising the awareness of the population about the importance of the city's architectural and cultural past, the examples of water towers abroad that

were given a new, cultural, function, are numerous.

One other example would be the water towers in the Italian town of **Budrio (the Emilia Romagna region)**, built in 1912 and renovated during 2002-2009 to serve various creative industries: concerts, theater, contemporary art galleries; they are a remarkable example of cultural capitalization of industrial-heritage assets.

The new function of the two water towers was selected in the wake of an architecture contest called "Premio Centocittà" ("the 100 Cities Award"). At the 2002 edition, the suggestion to convert decommissioned water towers into a dynamic space and a multifunctional center, respectively, won the competition and the 1 million euro prize. The conversion of the two water towers involved large-scale restoration work done by architect Andrea Oliva. The towers were in a state of advanced deterioration, there were large areas where the cement structure was eroded, because of the age; restoration work involved using once again the original construction materials: the old iron inside the structural frame was treated with stabilizers. New construction materials were used, too: glass; one of the water towers was "coated" in glass, which gave it a special esthetic look). The project is one form of creative and functional reclamation of the old water towers.

3.2. Tourism

The destination chosen for the **two identical water towers in Timisoara**, built in the early 20th century (1912-1924) at the ends of the water-distribution networks and serving to cope with the peak water consumption during the day (each with a capacity of 500 cubic meters), is the tourist one, as they are to be soon included in one

of the city's tourist circuits. The two water towers, located in the Fabric and Iosefin boroughs, were guarded round-the-clock, with employees' quarters located inside the very premises. In the wake of the late-2011 initiative of the Aquatim company, several suggestions were drafted with the goal of finding a new destination for this abandoned and steadily-deteriorating space. Among the suggestions, there were two with a cultural purpose for the water tower in the Iosefin-borough water tower: a) a Museum of Science and Technology in the Banat, which should include a media café, a children's playground, and at the top a grand-view spot where visitors could admire the city by means of various instruments; b) a Water Museum, where a teahouse and a restaurant would be opened on the ground floor, alongside a sidewalk pub open in summertime, and a place to display remote-controlled scale models of the ships that used to sail the Bega river in the interwar years, or an Aquarium.

The importance of water towers in the city on the Bega River is basically an economic one, as evidenced by the fact that Timisoara was the first city in Romania to be supplied by means of a water tower, an achievement also represented in the city heraldry, on its coat of arms.

The Firewatch Tower (Fig. 3) was built in 1890-1891 according to the plans of the chief architect of the Bucharest City Hall, George Mandrea (Berindei and Bonifaciu, 1980). The construction of the last Firewatch Tower in Bucharest (it entered service in 1889) was grounded in economic reasons and it was meant to solve two problems that the city administration was concerned with: a) enabling the fire brigade to continue its overwatch and fire alarm duties, after the

demolition of the Coltea Tower in 1888 (the oldest firewatch tower in Bucharest, built in 1715); b) modernizing water supplies in the Eastern part of the city. Compared to the present look of the building, it was initially planned as a 42-meter-high building with an ungainly architecture, designed to be able to bear a 720 m³ water tank.



Fig. 3. The Firewatch Tower (Bucharest)

The first floor was meant for the engineers and employees of the water-network service, and the second floor was used as the barracks of the fire brigade in charge with overlooked the city. On February 28, 1892, the City Hall officially received the building, ascertaining the quality of the construction work, but also the fact that the Water Plant had not received the new, improved-capacity pumps able to raise the water to the tank's height. For that reason, on April 22, 1892, the City Hall transferred the entire building to the Fire Brigade. The ground floor was modified to host the fire brigade's coaches and horses. The first floor was converted into the brigade's barracks, and the second floor was meant for the brigade commanding officer. The tower served as a fire lookout until 1910 when authorities switched to a system of notifications of fires by phone. In 1935, the fire brigade relocated to a new barracks, and the building was assigned several functions in succession until 1963 when it became the Firewatch Tower – the Romanian Firemen's Museum. Its interior

serves to display various ancient firemen's uniforms, various old implements used by the fire brigade, scale models of the various firefighting equipment (a scale model of the first force pump invented by Ctesibius of Alexandria in the 3rd century BC), blueprints, documents and medals, photographs, trophies won by firemen during the various international competitions.

The museum's valuable collections are displayed chronologically (from the oldest - dating to the Middle Ages - to the modern and contemporary age), and they also mention several aspects concerning the transformation of the fire service into an institution, or related to the participation of the fire brigade to some of the most significant moments in the national history (the 1848 revolution, the independence war).

The water tower in Buftea (Ilfov county, circa 20 km North-West of Bucharest) (Fig. 4) was built after the plans of the architect Anghel Saligny in 1920.



Fig. 4. The water tower in Buftea

Today it is an important tourist attraction for the Stirbey domaine and the town, from architectural and historical point of view. The water tower is located in the North-Eastern part of the Stirbey park and it was initially used to store the water needed by the Stirbey family. Later on, its special architecture turned it into an

important tourist attraction in the region and at the same time, very high-rated among technical-heritage assets. It is built in reinforced concrete, on four floors and in a classical-architecture style.

This category may be deemed to also include the water tower in Oltenița, hosting the Oltenița Art Museum.

3.3. Cultural activities and tourism

A category that merges the previous two, **cultural activities and tourism**, might also be taken into consideration in the case of several water towers in Romania, putting to best use the experience of other countries. For instance, **the Water Tower on the Margaret Island (Budapest)** (Fig. 5), situated on Margaret Island, (one of the most beautiful islands of the Danube), was built in 1911 in Art Nouveau style.



Fig. 5. The water tower on Margareta island (Budapest)

Today, it is UNESCO monument and houses different creative industries (exhibition hall, shows, concerts). At the origin, it was an industrial monument, built in octagonal form. It is considered the first building in Hungary where the new technology of reinforced concrete was used. This revolutionary building has lost today its previous function, which was to provide for the water supply of Margaret Island. With a height above ground 57 metres, a diameter of the basin of 13 metres and a volume of 600 m³, the water tower can be visited up

till the forth floor of the tower, which is 33 metre high. In 1977, it was listed amongst the ancient monuments of townscape rank. From 2011, it has been operated by the Open-air Theatre and serves as an exhibition hall for those visiting Budapest, Margaret Island and the Budapest Summer Festival.

In Bucharest, **the Vlad Țepeș Fortress** perfectly matches this last category. Vlad Țepeș Citadel (Fig. 6) is the reproduction of Poenari citadel and was built in 1906. Today here is The National Office for Heroes Memory (since 2004). The initial destination of the building was as a water tower, but, because of the unsightly form of the tanks, that failed to meet the requirements of king Carol I of Romania (1866-1914), the initial idea was abandoned, and the project was converted into a reproduction of the Poenari fortress, built in Argeș county by Vlad Țepeș, ruler of Wallachia in the 15th century. For a period of time, the water tower was assigned a cultural function, hosting a series of artworks.



Fig. 6. The Vlad Țepeș tower (Bucharest)

Later on the 23-meter-high, 200-cubic-meter water tower became a spot offering a scenic view of Bucharest, its architecture being a particular one, blending crenellations and a smaller-sized tower built on top of the main tower. It's interesting to note its function during World War I, as a host of the first wireless-telegraph post in Romania, a 8-kw transmitter used to maintain connection

with France, Athens and Rome (Parusi, 2007:480). Before its present-day use as The National Office for Heroes Memory, the tower was also used as an army barracks in the interwar years, living quarters for the troop guarding the Unknown Soldier Memorial, and, since 1990 as the guard post for a gendarme unit. Other towers that can be included in this category are: and the water towers in Brăila and in Drobeta Turnu Severin (Fig. 7).

The water tower in Drobeta Turnu Severin, built in 1915 so as to ensure the city's supply with water from the Danube, it was recently renovated and refurbished by means of a modernization and conservation project funded by the IPA Romania-Serbia cross-border cooperation project. The water tower in Drobeta Turnu Severin city will host a tourist information center, an exhibition space and an art gallery, a museum presenting the history of the town's water supply services, a photograph and sculpture exhibition, a literary café and a grand-view spot.

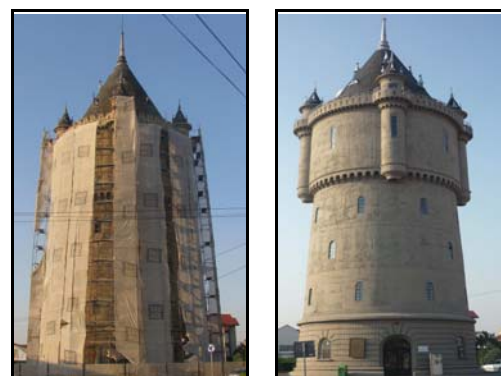


Fig. 7. The Water tower in Drobeta Turnu Severin: a) before restoration b) after restoration

The water tower in Brăila city was built in 1914; at 35 m, it was the highest construction of this type in Romania at that time. In 1978 the water tower was handed over to the Consumcoop state enterprise, for refurbishing and conversion into a public eating house; a high-rise restaurant was inaugurated.

It is scheduled to enter a process to conserve the structural frame and to rehabilitate the interior by completely redoing the interior and exterior finishing, as it is to be converted into a cultural and scientific center that would host exhibitions at the lower floors and an astronomic observatory equipped with four telescopes at the last floor; the biggest part of the investment would be funded by European funds, with the difference coming from the city hall.

3.4. Other services

The range of water towers that were given a use in the service and trade sector is another category of positive transformation of certain constructions that either feature a remarkable architecture or have played an essential role in the history of certain places. It does happen, indeed, that unlike previous categories, this one is less frequent among the attempts at a functional conversion, conservation and/or promotion of such constructions in Romania. The solution may be linked to the trivialization they might be burdened with in the wake of such “disfigurement”, although this is not always the case.



Fig. 8. The old water tower in Potsdam

The old water tower in Potsdam (Fig. 8) is an example of architecture and esthetics, as it is entirely built in brick.

At the same time, the former water tower, located close to the central railway station in Potsdam, was converted into a very busy public restaurant.

One other example of non-cultural reuse of the water towers is the water tower of the former Dynamit-Nobel factory in Bratislava, founded by famous Swedish inventor Alfred Nobel in 1873. The old water tower built in 1906 was converted into an office space by the representatives of a well-known architecture firm in Slovakia, a project that was completed in 2008 (Bartošová, 2011). The tower was relocated from the factory premises and they attempted to preserve the initial industrial look. The most important changes were done on the inside: the central area previously occupied by a spiral staircase is nowadays occupied by the elevator. The water tank has been converted into office space, carving up new windows so as to supply natural light (Bartošová, 2011).

The water tower in Riga, Alise, commissioned in 1910, stands out because of its peculiar architecture; it was the work of architect Wilhelm Bockslaff. The tower was built by SIA Riga Water with the purpose of supplying the water necessary to the population of the capital. In time, population growth required an increase in the water-supply capacity. The tower was subsequently raised by another 7.5 m in 1937 and a second water tower was built close by. At the same time, the upper part of the tower underwent certain modifications: below the tower roof special chambers were made in the wall to insert jacks. The oldest water tower has an impressive structure due to its height of 40 m, to the 2m-thick brick walls, as well as a stylised version of Riga’s coat of arms above the entrance. The water tower of Riga has

undergone a form of conversion related to creative industries: during 1991-2010 it was used also as underground recording studio called 'Tornis'.

3.5. *Technical and industrial water towers with a potential for conversion*

One should not disregard the analysis of this final category, because technique and industry are blended into the history of a space, not merely from the economic point of view, but also urbanism or social perspective.

A positive example is the **Drumul Taberei water tower** (Fig. 9), located in one of Bucharest's peripheral boroughs, and built in the early 20th century.



Fig. 9. The water tower in the Drumul Taberei borough (Bucharest)

In the late 1960s, it was decommissioned and at the same time it was converted to host a food store on the ground level as early as the communist period. Just the way the store still does business nowadays, the same way the identity of the borough continues to be defined by the presence of a water tower, but with an architecture apart, coated in brick, which gives it an elegant note and helps it stand out in mass of blocks of flats typical of a past age.

The history of the **water tower at the now-closed Tobacco Factory (Belvedere)**

in Bucharest, is bound to the history of that place, whose beginnings are found in the early 19th century. In 1814, a palace was built on the premises of a large estate in the Western part of Bucharest; it was known as the *tower house*, or later on, as the Belvedere palace. The estate was sold to the Romanian state at the end of the 19th century (Parusi, 2007). Nowadays, the water tower included on the list of historical monuments in Bucharest also functions as a warehouse for a hypermarket in Bucharest, Bricostore S.A. This wholesale distributor on the Romanian market got involved in the conservation of the tower, by surrounding it with a fence, thus possibly contributing to rescuing it at a time when works to improve road infrastructure in the area was particularly intense (the Basarab overpass).

Another water tower with an outstanding architecture is located on the premises of the former **Match Factory in Bucharest** (Fig. 10), whose construction began in 1878 on the Filaret Hill platform, close to the Stamp Factory and the Filaret railway station. The factory was inaugurated in 1879.



Fig. 10. The water tower on the premises of the former match factory (Bucharest)

Nowadays, the factory is out of use, as it stopped functioning in 2000. The water tower, a historical monument in itself, features a particular architecture, and its

presence in one of the capital's old boroughs, whose atmosphere is imbued with genuine values for Bucharest's economic past, backed by the architectural value of the area, turn into obvious arguments to preserve the tower, and, moreover, to launch a process of functional reconversion (as it happened with another building in the vicinity, the Commodity Exchange, which hosts a series of advertising, commercial and urban design ventures etc. (Cercleux *et al.*, 2012).

The water tower in Drăgășani (Vâlcea county) was built at the same time as the town's fish and meat market, that is the 19th century, in the central borough, close to the market and to the town hall. It has a special look, and it was recently renovated. Grace to its architecture and importance in the history of the city, this water tower would fulfill the criteria for an eventual functional conversion in the cultural field.

Other tower that can be included in this category is: the water tower in Târgu Jiu (built in 1909, located in the town's public garden, recently renovated) (Fig. 11).



Fig. 11. The Water tower in Târgu Jiu

4. Discussion

The current Romanian law on technical and industrial patrimony defines it as the whole of mobile, immobile goods and

some of the complexes they make up, representing significant testimonies of the technical and production ventures that were the foundation of the socio-economic evolutions of human society, from the first preindustrial manifestations and up to the present (Law no. 6/2008).

The water towers represent an important element of the industrial heritage in Romania. Although water towers are considered isolated industrial elements (Gross, 1933) and self-sufficient structures (Popelová, 2007), it is necessary to conserve them, even more so as they are symbols of the industrial activity.

Nowadays, the water towers are more and more encountered in the policies of territorial planning. The transformation so necessary of the ancient technical and industrial buildings in futures strategies for the socio-economic local evolution can find its answer in the new functions of the water towers.

The performativity of buildings should also be mentioned, in connection with the reuse of industrial buildings. Performativity brings life to buildings, as well as to the public space, and changes them in the most dynamic manner (Bărbuică, 2012). From this point of view, one could mention the firemen's watchtowers, which, in the wake of measures to conserve the original form, were converted into museums (Bucharest, Cluj, Satu Mare), standing out in the present urban landscape as important cultural attractions.

In the past few years there has been a change in vision in the refurbishing of the current technical museums by converting abandoned industrial sites into museum spaces. This is a new phase in the

evolution of museums, i.e. retaining the “vitality” of decommissioned economic centers, turning them into the image of the local culture (Merciu *et al.*, 2012b).

Investments in cultural heritage can generate positive effects for the local economy (Barabash, 2012), not only in terms of cultural consumption, but also in the form of increased employment and income (Bowitz and Ibenholt, 2007).

Interest in preserving industrial abandoned sites, is not only scientifically but also economic (Langstraat, 2006) and heritage issue (Orange, 2008) for regions which are now severely affected by industrial restructuring process.

The use of the industrial heritage predominantly as an economic resource, disregarding its connections with the local memory and identity, should be avoided (Del Pozo and Gonzales, 2012).

In the past few years, water towers in Romania, whose initial function was an industrial one, have been undergoing a phase of functional conversion, a transformation that ended with their acquiring completely different significances from the initial ones. While, in general, their metamorphosis occurred within the scope of cultural and touristic activities, nowadays the range of conversions tends to become ever more diversified.

The evolution of the industrial water towers of the Pantelimon Draper from Bucharest or the Iași tower is similar to the evolution already undergone by several water towers abroad: for instance, in France, in 2005 the water tower in Saint-Martin-en-Campagne was camouflaged by means of a *rural landscape*. Other examples include:

Bémécourt, La Couture Boussey, Saint-Antoine-la-Forêt (also in France); *lighting* – the water tower in Châtelet, Sente aux Lapins in Canteleu, the theme chosen being a lighthouse, recalling a lighthouse that used to be in service close to the Rouen harbor.

The typology of the themes chosen to decorate water towers is very varied, across the world. For instance, in France, several themes chosen are closely connected to:

- a) *identity and the local economy*: in the Maine et Loire department (grapes – Martigné-Briand; grapes and a welcome sign – Tillières; rose – Doué la Fontaine);
- b) *a sign welcoming visitors to town*: also in the Maine et Loire department, Montreuil Bellay and Le Longeron;
- c) *advertising space*: Torfou (also in the Maine et Loire department);
- d) *war hero memorials*: the water tower in Bullecourt (in Pas de Calais department) (Stéphane, 2008), whose walls depict France, Great Britain and Australia, in memory of those killed in World War I; the water tower in Pozières (Picardie, France) is decorated with images that bring back to mind the Australian army’s victory over the Germans.
- e) *landscapes: marine* – the Blériot-Plage water tower (in the Pas de Calais department) where a seascape and a seagull are depicted; Le Crotoy (Picardie, France), seascape; *field landscapes* – the Crèvecoeur-le-Grand water tower (Picardie) – fields and windmill; the water tower in Petit-Couronne (Haute Normandie, France) – landscape and the Seine river course.

It should not be overlooked that history, traditions or local identity do not necessarily become symbols to represent on the water towers’ walls, but polls conducted among the population in the

area determine selection of the theme to be represented.

Visiting water towers on special occasions is a way to promote them: the world water day (in 2013 the theme was: water and cooperation), (the de Stry water tower in Tinlot, Belgium); heritage days (the water tower in Arad – themed and art exhibitions, concerts and shows, marking the “European Heritage Days”), the art festival associated to the water tower in Sofia – “Water Tower Art Fest” (at its seventh edition in 2013, when artists from all over the world are invited to attend, so as to take part in contemporary art events; renovating the water tower in Sofia and choosing it as the main premises for an international cultural event was motivated to bring back life to an abandoned space that still had a lot to offer).

It is not a coincidence that the World Tourism Day in 2013 has the theme “Tourism and Water – Protecting Our Common Future”, emphasizing tourism’s responsibility in the conservation of the planet’s vital water resources and the need for making a pledge in this respect. The theme complies with the United Nations’ declaring 2013 International Year of Water Cooperation, offering a worldwide opportunity to highlight the shared responsibility of various fields in general sustainability goals.

The link between the two events is partly the result of the water-related heritage, found both in natural landscape assets (Delta-type wetlands, lakes) or cultural-historical heritage assets (water works, bridges, baths and aquariums, and last but not least industrial assets).

In this respect, one should mention the oldest water works in Romania, some of them converted into museums (the

waterworks in Floresti, Cluj county, the waterworks in the city of Timisoara, Timis county, the Grebla hydropower plant in the city of Resita, Caras-Severin county, the waterworks in Suceava city).

The Water Museum in Floresti commune (Cluj county) was inaugurated in 1992, marking the 100th anniversary of the creation of the Cluj Water and Sewerage Works, at the initiative of the County Water Company. It is the first and only Water Museum in Romania.

The museum was created inside the building of the first underground-water pump house, which had entered service in 1898. The museum and the outer premises display numerous items related to the activity of the waterworks (ducts, pumps, pipes, tools and machines) and archive material (maps, technical plans, photographs).

The waterworks in Suceava is a landmark asset for both the industrial heritage of Suceava county and nationwide. It is included under the name of “the former waterworks” on the list of the historical monuments in the city of Suceava; it currently hosts the offices of the “Suceava Waterworks” architecture, urban culture and landscaping center, with the North-Eastern branch of the Order of Romanian Architects as its coordinator.

The waterworks hosted the urban-culture days, an event at its second edition in 2013, with the theme: *Regeneration of the recent heritage*. 2013 also means the 101-year anniversary of the commissioning of the former waterworks.

In Romania, water towers are, despite certain positive examples, a frequently disregarded part of the technical and industrial heritage. Raising the awareness

of the population becomes essential, even more so as water towers are part of the testimonials of the past and, therefore, they should continue to remain in the mind of the population.

While in the past water towers used to be spatial landmarks for the local population, in the urban or rural landscape, nowadays they are becoming more of temporal rather than spatial landmarks. Unfortunately, the absence of steps to inventory or protect them often leads to the destruction of some of them (e. g. demolition of the water tower built in 1927 after the plans of Virginia Haret, the first woman architect in Romania), although they are not simple buildings, monuments, but they have a higher value, as they matter to the history of technology. In addition, water towers marked, in sequence, the evolution of landscapes.

In this view, alongside the participation of the various associations, foundations, research centers, and individual participation, the contribution of relevant institutions that can get involved in protecting water towers becomes especially important, so that the towers may be preserved for the appreciation of future generations.

In France, the Water Towers of France Association was created in 2007, whose goals are: creating a database of the water towers in France; collecting photographs, documents, plans of the water towers; taking part to the conservation and valorization of the heritage; actions to inform, educate and train the young; submitting suggestions for the improvement of the living space of the local population.

In Holland, the National Water-Tower Society was created with the main

mission of inventorying, conserving and promoting water towers (Nijhof, 1993). The presence of these associations in various countries is proof that there is a definite interest at European level in the optimal conservation and valorization of water towers as cultural resources.

However, mention should be made of the low national interest in conserving cultural assets, irrespective of the category they fall in, as well as the small progress made towards conservation and conversion of water towers.

Although the water towers built in concrete are predominant, in terms of number across Romania, and the first-glance impression they make is an absence of any esthetical or architectural value, they can be reused in several ways, so that their transformation can have positive effects: for instance the water tower in Pantelimon borough (Bucharest). The action of “shaping” it by painting it into an art tower reveals its capacity to become, in addition to being a city landmark, in terms of what the activity of the drapery used to mean, an example of the esthetics of the beautiful. Some of the less esthetical landscapes or objects that were converted by means of art have not always been accepted as artworks from the very start (for instance at the time of its construction, the Eiffel Tower was deemed unaesthetical by the population of Paris).

5. Conclusions

The current conversions of water towers, both in Romania, and across the world, are not always unanimously accepted by everyone. Sometimes they are criticized by the public, and the points of view may differ, most of the time concerning the architecture and functionality of the water towers.

The manifold significances of water towers justify their status of cultural assets in the category of industrial-heritage assets, as well as their conservation and valorization, by means of various conversions (cultural, touristic, services).

The present study will be supplemented by a detailed analysis of water towers across Romania, as a result of their complex nature, given by the manifold significances they have acquired (historical, technological, architectural, cultural).

In addition, a goal to be pursued in the future is the creation of a database and the configuration of an informational geographic system that would allow, by means of several layers of cartographic information to reflect the location of water towers, identify certain details related to their history, their past and present destination, elements that would enable visitors to perceive water towers as being much more “tangible”.

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