

THE WAR MEMORIAL OF CONSTANTINE FACING RISKS AND VULNERABILITY.

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Abstract

The war memorial of Constantine is in a state of advanced degradation; despite its major importance, the monument and its surroundings are facing devastating factors that alter both its invaluable values and authenticity. So, what are the main factors that caused this degradation? Initially, the degradations noticed are due to a set of risks. The in situ survey conducted as well as the comparative study confirmed the presence of risks on the site through the identification of nine natural and anthropogenic hazards. Furthermore, the cross-examination of the data obtained from the subsequent studies showed that the damage of the risks influenced the monument in two forms: physical and functional. In conclusion, the effect of the damage increased the degree of vulnerability of the monument.

Keywords: Hazard; Degradation; Risk; Vulnerability; Heritage value; the war memorial of Constantine.

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I- INTRODUCTION

Today, disaster risk tends to increase. This situation is due to many factors such as accelerated urbanization, the demographic factor and climate change. For this reason, disaster risk reduction remains a major concern in the current scientific debates. Today, and like the other components of the urban setting, architectural heritage is increasingly exposed to several risks, posing a real threat to its heritage values, integrity and authenticity. Because of its fragility and age, architectural heritage properties seems to be much more vulnerable to the harmful effects of risks than contemporary built objects, designed according to security standards, and using the new technologies. However, in spite of the great importance given to architectural heritage properties as a real engine for the socio-economic development of the communities, some of them are completely neglected. They are facing the wear and tear of time, as well as the manmade destructive actions, which accelerated their deterioration and sometimes lead to their irremediable loss. Recent events showed the dramatic damage caused by risks on world heritage properties. For example, the historic center of the city of Bam, destroyed by the earthquake that hit the city in 2003. Moreover, the rich cultural heritage in the coastal provinces of Sri Lanka was also ravaged in 2004 by a tsunami; besides, the traditional church of New Orleans, was destroyed in 2005 after the hurricane of Katrina ... etc. This situation is perceived as paradoxical; heritage assets which are highly important for the humanity should be well protected by risk and heritage managers, through the implementation of preventive measures and appropriate strategies to reduce the hazard's effects on these assets. At the local level, this kind of situations was raised on a colonial architectural heritage, which is the war memorial of the city of Constantine. Dating back more than eighty-seven years, it is considered as one of the most symbolic landmarks of the city, due to its precious values and authenticity.

Nevertheless, it is in a state of advanced degradation, affecting both the physical aspect and its intangible dimension. Because of its abandonment by the authorities and the citizens, it suffers the harmful effects of many factors, causing considerable damage to its site. Therefore, a question arises: What are the factors responsible for the current degradation of the war memorial of Constantine? The aim of this study is to highlight the severity of the damage that affected the war memorial, and how the negligence of the authorities reinforced that. Then, to identify the factors which caused the degradations, while verifying its relationship with the risks. Finally, to identify the influence of the damage on the monument's degree of vulnerability.

The war memorial of Constantine is located near the university hospital center of Constantine, on the edge of the cornice, and on the heights of the old rock "Sidi M'cid" of nearly 700 m. It is recognized by its imposing urban site, which overlooks the old bridge of "Sidi M'cid", and offers an unobstructed panoramic view on the outskirts of the city (fig.1). Moreover, it benefits from an exceptional sunset that highlights the picturesque city of Constantine. With its singular characteristics, this site has been chosen to sublimate the architectural work.



Fig. 1. The panoramic view from the monument. (2013)

II. METHODS & TOOLS

In order to achieve the above-mentioned key objective, the study was divided into three distinct parts, while all parts aim to a secondary objective. Each part will serve as a support for the unfolding of the next part. Therefore, the parts are interdependent and carefully combined. The three parts of this study are as follows:

A. The determination of the heritage values of the monument

Each heritage object should be preserved and valued because for its very positive influence on many aspects of the way a community develops. This refers mainly to its valuable heritage values and to his capital as an excellent local educational resource for people of all ages. For this reason, before proceeding to the protection of the monument against the risks that it incurs, this part will estimate first the importance of this heritage for the city of Constantine, by detecting its heritage values and identifying how they can be a proven source of benefit to local economies. It concerns also the specification of the consequences of its loss or forgetfulness. *"The war memorial of Constantine holds a capital of interest and sympathy that far exceeds Constantine"*. [1]. The methodological tools to support this study are as follows: an analysis of the documentary content relating to the war memorial, including press articles, the archives of the city of Constantine, a field survey, the testimony of officials, associations and the citizens of the city.

B. Comparative study: survey of deteriorations

In order to figure out the origin of the degradations raised on the monument and its surroundings, it is essential to identify all the deteriorations that affected the monument since its construction, as well as the moment and the place of their appearance. To carry out this work, a comparative study took place between the original physical aspect of the monument and its present state. The methodological tools used in this section are analysis of the documentary content, direct observation, architectural study of the monument, pathological survey, architectural survey, old photographs. To ensure accurate identification of the deteriorations, the perimeter of the study was divided into four main zones, containing the important parts of the monument. These parts are the exterior facades, the interior of the monument: the niches, the walls, the staircase, the decoration and the exterior layout: statue of victory, orientation table, side esplanades, access stairs, and immediate environment: road, green spaces.

C. Survey of hazards

The Final part consists on the verification of the presence of all kinds of risks in the monument and its surroundings. This step is essential because it will precise the relationship between the appearance of the degradations and the occurrence of the risks. The main support used to carry out this study is the theoretical risk grid, which contains a set of hazards that can affect any heritage property. The presence of each type of hazard mentioned was checked at the monument and its surroundings using press articles, testimonials from citizens, associations and specialists, field visits, the vulnerability map of Constantine, and the expert study "Simecsol".

III. RESULTS

A. heritage values

The study of the monument's heritage values revealed the following results:

- **Historical value**

This value refers to the important historical event that the war memorial commemorate, which is the First World War (1914-1918). The monument was erected to the glory of the 844 soldiers of all faiths who died for France during this war. In fact, this historical event of massive devastation and loss of lives changed the history of the entire humanity. However, it stills alive due to this monument; it constitutes an immortal witness that transmits this important history from one generation to another. Moreover, this monument is exceptional, because it is the first war memorial of France to be built (fig.2).



Fig. 2. *Celebration of the memory of soldiers who died during the First World War. (Doumergue, 1930).*

- **Architectural value**

The monument remains a piece of art. As an arch of triumph, it is characterized by a colossal architectural style, particularly inspired by the arch of "Trajan" situated in the city of Timgad. It is also recognized by the rich architectonic elements of the Roman architecture such as column, bay, capital ... etc.). Besides, it is marked by a set of impressive decorative elements especially the statue of victory and the orientation table. In addition, the choice of noble materials is refined for its edification like carved stone, bronze ... etc. (Fig.3).



Fig. 3. *Architectural composition of the monument (Kherouatou, 2015)*

- **Economic value**

The monument is a valuable asset for the city, because it is a proven source of benefit to local economies, particularly through tourism. (Fig.4). Due to its high environmental quality, architectural style and its particular urban site, it contributes in the increasing of tourist attractiveness of Constantine; *"The war memorial is a real tourist stop and one of the jewels of tourism in Constantine for both foreign and domestic tourists"*. [2].



Fig. 4. *Frensh tourists visitng the monument (2017)*

- **Social value**

The urban environment of the monument promotes encounters between the citizens and social inclusion of the community. Thus, many associations organized several social events, and selected the monument and its surroundings as the appropriate venue for its course. Some of these social events are the ceremonial event of the release of balloons, Qwhet el Asser, Ramadhan evenings ... etc. as a result , the monument can offer a true area of relaxation and family reunification, through the solidifying of social ties between all social categories, and offering some opportunities to meet new people. (Fig.5).



Fig. 5. *The social event « the release of balloons ». (2013).*

- **Cultural value**

From another side, the natural majestic site where the monument is built endows it with an exceptional spiritual dimension, which constitutes a source of inspiration for many artists of the city including photographers. For others, the site of the monument is an open-air theater that can expose their artistic creativity. (Fig.6).



Fig. 6. *"The Bridge Symphony", hosted by the National Orchestra. (D.R ,2015)*

- **Political value**

The extent of the historical event that the monument commemorate goes far beyond the Constantine region, and even the national borders. The monument testifies a common history, shared between Algeria, France, and Germany because these three nations are concerned by the great world war (1914-1918). At Final, this war memorial can strengthen cooperation, exchange and international political relations between these nations. (Fig.7).



Fig. 7. *Ambassadors of the Three Nations Celebrate the Commemoration of the Armistice 1918. (Oudina. 2015).*

B. The comparative study

The comparison between the original physical aspect of the monument and its present state ended with the identification of several modifications that the monument undergone. The raised changes are the result of indeterminate factors, as well as some actions made by citizens, associations and authorities. First, the impairments observed in each of the above-mentioned parties are as follows:

- **Exterior facades**

Graffiti on facade surfaces; the deterioration of the stone; many breaks on the stones particularly in the base; the dedication above the columns is no longer visible; the use of inappropriate paints on certain parts of the facades.

- **Interior space of the monument**

Existence of graffiti on the interior walls; the corrosion of the bronze plates, aging and breakage of some parts of the bronze plates. The disappearance of a big part of the central bronze plate; Dirt on the walls, on the floor of the interior

niches, and on the stairs; the removal of the lock of the staircase, the breaks and the degradations of the steps.

- **Decoration and landscaping**

The corrosion and the presence of graffiti on some parts of the statue of victory. Traces of delinquent acts: drug use and alcoholic beverages, suicide attempts...etc. The destabilization and breakage of the support that maintain the orientation table. Acts of vandalism on the map using sharp tools. The subsidence of the platforms in several parts of its esplanades. The breaks on the retaining wall and access stairs on the left. Sanitation problem caused by the closure of the inlets with cement.

- **Immediate environment**

Because of the low attendance in the monument, the visitors of the university hospital center transformed the access road into an illegal parking; thus, the massive loss of many trees in the upper part of the stairs leading to the "Sidi M'cid" bridge. Consequently, the beauty of the site is greatly altered. Moreover, the construction of an illegal habitat (makeshift housing) close to the monument.

On the subject of the actions undertaken by the citizens, associations and the authorities, they aimed at the rehabilitation of the monument in order to improve its current state and eliminate as possible the previous degradations. These actions were organized within the framework of volunteering, and they concerned: the washing and the painting of the graffiti found at the exterior facades and the interior walls of the monument; the operation of afforestation at the level of the green spaces surrounding the monument in order to replace the lost trees. On the other side, the authorities launched other actions, particularly in 2015, for the urgent rehabilitation of the monument, because in 2015, the city of Constantine hosted two major events, which are : Constantine, the capital of Arab culture in 2015, and the celebration of the armistice of 11 November 1918. The operations made to the monument and its surroundings are as follows: the substitution of the central bronze plate by a Marble plate; The covering of one of the internal niches built with authentic stone by faience; The painting of the statue of victory; the cleaning of the site, the lighting of the site, installing a police patrol for safety, laying garbage bins, installing barriers to prohibit illegal parking.

C. The survey of risks

The study referring to the verification of hazards, based on the theoretical risk grid showed the presence of nine several hazards, of different origins. The following presentation of these hazards is made in chronological order: according to their moment of occurrence from the oldest to the most recent.

- **landslide (1930)**

This hazard is the oldest, since the monument was erected. "In 1930, at the time of its inauguration, the monument was already subjected to a geological problem related to the rock" [3]. Over time, this problem has become worse, creating very visible deformations in different parts of the site. According to Benabass [4], their appearance refers to two major reasons: first, the delicate position of the

monument on the natural limits of a "mega-block" of the rock, which is out of step with the second. This part of the rock is the most vulnerable, because it is subject to strong pressure. In addition, the presence of ancient limestones, as well as the circulation of warm waters loaded with Co2 (a weak acid) inside the rock, allowed the creation of empty internal cavities of a very weak structure. The natural fracture of its faults resulted in continuous subsidence (fig. 8), responsible for the destabilization of the structure of the monument. This situation was exacerbated in 2009, due to the shearing of the trees in the back part, on the pretext that they prevent the lighting of the site, but these trees strengthened the soil and contributed to the reduction of this phenomenon.

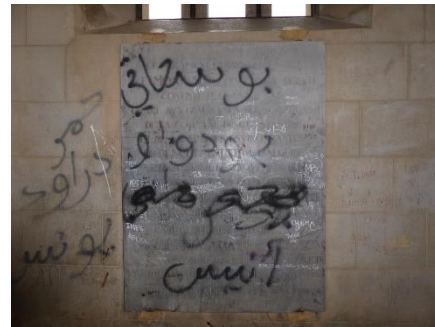


Fig. 8. Plan of the architectural survey on the location of the deformations at the level of the monument (2015).

- **Non-recognition of the monument as a "heritage"**

Until now, the monument is not registered in the national list of cultural heritage, it is still considered as a French legacy. Therefore, neither a patrimonialization process has been scheduled for the monument, nor a development program or budget was dedicated for its protection. The authorities neglected this war memorial for a long time, and even abandoned it to the destructive actions of man and nature, engendering other types of risks with a much more serious effect.

- **Insecurity and bad attendance (1990-2014)**

The abandon of the monument by the authorities and the citizens for a long time, transformed it into a meeting place for delinquents. For more than sixteen years, he suffered many social evils. The absence of guarding and the law attendance of the site favored the frequentation of the offenders and the insecurity. "Groups of young people are hiding in certain corners to consume drugs and alcoholic beverages, with impunity, and all the knife brawls that can occur." [5] Consequently, the idea of going to the monument under penalty of aggression was perceived as a dangerous initiative: "it was too risky to pass even in the vicinity" [6]. This risk has affected negatively the reputation of this highly symbolic site of Constantine, and reduced its attractiveness to tourism.

- **Vandalism (1990-2014)**

Many parts of the monument have suffered serious acts of vandalism: the interior walls of stone, the bronze plaques, and the exterior facades have been deformed by insolent graffiti (Fig. 9). In addition, the recently installed marble slab

and the bronze plates were vandalized using sharp tools. Furthermore, the lock that closed the stairwell was broken off to reach the ridge. Even the orientation table in the posterior esplanade has been seriously damaged: its support suffers from instability due to an attempt to pull it out, and the map has been disfigured with white weapons (fig.10). The impact of such actions is considerable; they jeopardize its authentic original appearance, and accelerate its natural deterioration.

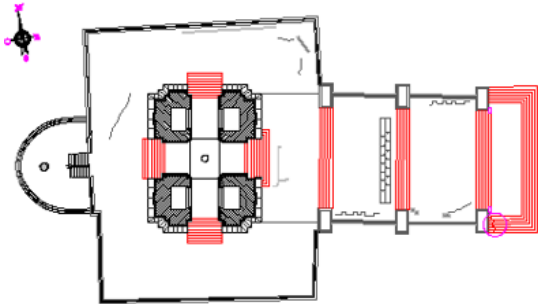


Fig. 9. Vandalism on one of the interior plates by graffiti (2013).



Fig. 10. Vandalism on the orientation table (2017).

- **Climate factors**

The war memorial is exposed to several adverse effects due to climatic factors. First, heavy precipitation, especially during the winter, blocks the only mechanical access leading to the monument with a large area of stagnant water. This phenomenon made the access to the monument impossible, particularly for tourists. In addition, this precipitation aggravated the problem of landslides by activating the movement of land. Moreover, the climatic effect has accelerated the corrosion of the bronze of the interior plates, as well as the statue of victory (fig.11). Due to its chemical composition containing more than 54% copper, it oxidizes with atmospheric air under the effect of moisture and carbon dioxide, creating a layer of a color called "patina" Or "grey screen". The consequences of this chemical reaction on the state of the metal are important: "A bronze statue of 70 years has lost on average 10 to 20% of its metal" [7]. This is the case of the monument, which dates back more than 85 years.



Fig. 11. The corrosion of the statue of victory (2013).

- **Environmental pollution (1990-2014)**

According to the survey, there are two types of pollution in the monument's site, which are visual and olfactory. Starting with the olfactory pollution; because of the absence of regular maintenance and cleaning for the different parts of the monument, especially the interior spaces, it has turned into "public urinal". In addition to the staircase and the interior walls, "the four niches under the arch and the walls covered with obituary registers of bronze, have become urinals» [8]. The interior spaces of the monument are filled with unbearable dirt and ammonia odors (fig.12). Concerning the outside environment, the visual pollution refers to the garbage bins, which are never collected regularly by the rippers. The associations or the citizens mostly handle this mission. Furthermore, the presence of a precarious habitat approximately to the monument, built of makeshift materials created a remarkable mess at the site. All these forms of pollution undermined the particular urban view of the monument, and affected negatively its reputation.



Fig. 12. Dirt in the inner niche (2013).

- **Fire (2013/2016)**

In October 2013, a fire destroyed a big part of the undergrowth situated in the lower part of the staircase joining the monument to the "Sidi m'cid" bridge. A plenty of centuries-old trees of all kinds were burned by fire and disappeared. The same accident occurred one more time in July 2016. Although these fires have been controlled without causing direct damage to the monument, the risk of fire is nevertheless present with a high possibility of occurrence, putting in danger the monument itself and / or its surroundings. Whether it is of human or natural origin, fire remains among the most difficult risks to control due to its rapid spread, and the irreversible damage that it can cause.

- **Theft (2014)**

On January 23, 2014, the Commemorative plaques of bronze were severely massacred by some persons who seized the opportunity of the Algeria-Tunisia match during the African Cup to execute their crime. Using a chainsaw, two of the eight commemorative bronze plaques were torn off. A Street light powered the electric saw used in this act. Therefore, this highly historic site has been disfigured, becoming unrecognizable. The plates are unrecoverable after passing them into a foundry of copper traffic. The former mayor of Constantine stated: "We are consulting with the heritage commission of the municipality in order to call on experts and historians to provide us with the exact names of all soldiers who appeared on the missing plate. Even so, it is a hard job, but we are going to do it." [9] This irreversible loss is very serious, because it has affected the most important part of the monument. The bronze plaques represent the main reason for the edification of this monument. Certainly, a restoration will allow the recovery of the missed plate, but only in its physical aspect. The authenticity and the originality are lost forever. In fact, this kind of risks is due to the abandonment, bad attendance, and particularly the absence of security at the site. The night watchman of the monument is retired, but the municipality has not assigned a replacement to protect this war memorial. (Fig.13).



Fig. 13. *Stolen Central Bronze Plate (2013).*

- **Inadequate processing operations (2015)**

This risk is the most recent. It appeared mostly during the preparations for the celebration of the 1918 armistice at the level of the monument, which was planned on November 11, 2015. After a long period of abandonment, the commune, in collaboration with the French Embassy in Algeria, undertook a plenty of operations aimed at its rehabilitation. The main operation consisted of a restoration: the lost bronze plates were replaced by others in marble, bearing the same names of the soldiers. In fact, according to Eugène Viollet-le-Duc, the restoration of a building "is not to maintain it, to repair it, or to do it, but to restore it to a complete state that may never have existed." [10]. thus, the restoration consists of the refurbishment of the object, and returning it as close as possible to the original state. However, it was not the case in the restoration of the monument; the marble used does not match with the original bronze (fig.14). This failed operation lead to a disfigurement of the site. The identity of the monument was altered after causing this discordance with the original state. A similar situation in a city renowned for its craftsmanship of brassware and the massive availability

of copper arouses a lot of debate. This kind of operations was repeated for the interior walls of the monument after the installation of a faience cladding, above the authentic stone. In addition, the painting of the statue of victory to hide the effect of corrosion, which completely changed the original color. Such actions seem futile and harmless, but in reality, they seriously jeopardize the monument's heritage values, in particular its integrity and authenticity. These two fundamental elements constitute its importance and at the same time entail its safeguarding.



Fig. 14. *Marble plaque replacing the stolen central bronze plate (2017).*

As well, to ensure the safety of the monument and the visitors, a police patrol was permanently installed (Fig.15). Certainly, delinquency has disappeared and the citizens are safe, but its remarkable location gives the visitor a feeling of fear and dangerousness, which makes the monument much less attractive. The ideal solution would be to revitalize it, by giving it a use value, that refers to the participative social activities and animation. This kind of functions allows the installation of a set of infrastructures that encourage the regrouping of people such as cafeterias, restaurants ... etc. In this way, the site will be more lively, attractive, and secure.



Fig. 15. *Installation of a police patrol (2017).*

VI. DISSCUSIONS

In conclusion, the study carried out on the identification of the monument's heritage values revealed the following points:

A. *The variety*

The war memorial of Constantine contains an invaluable variety of values, which concerns different aspects. In fact, they can be grouped into two distinct categories.

- **Values of existence** : they refer to the historical and the architectural value.
- **Values of use** : represented by the social, economic, cultural, and political value.

B. The war memorial: an engine for the development

The values of the monument are a valuable asset for the city, because of its important role in the city's cultural and socio-economic development, thus they can make a very positive contribution in improving the quality of life of the citizens. Furthermore, the attractiveness of the historic environment of the monument assists in attracting all types of external investment not only the tourism. Besides the current study showed how the monument could be a potent driver for the community action.

As for the comparative study, the degradations raised in the form of alterations affect the war memorial in two different forms, according to the type of their impact, namely:

A. Physical impact

- The alteration of its physical integrity.
- Defacement of the original architectural identity of the monument, as well as its materials such as stone and bronze. This leads to the loss of its authenticity.
- Degradation of its environmental quality.

B. Functional impact

- Downgrade the war memorial by putting at risk its irreplaceable heritage values.
- These deteriorations reduce its attractiveness to tourism, even its abandonment, which leads to the insecurity and bad attendance.
- The deterioration of an important part of history without its evanescence can lead in the long term to its forgetfulness.

Regarding the survey of risks, the verification of their presence was positive, and the risks identified can be classified according to two criteria: the origin of the hazard, which is natural and anthropogenic, as well as its process of slow or rapid development:

C. Primary hazards

With a catastrophic effect, characterized by a low frequency and speed occurrence, but their impact is rapidly perceived.

D. Secondary hazards

Characterized by a slow and gradual occurrence process. Their impact is not immediately perceived, it evolves over time.

Natural origin	Anthropogenic origin
Geological risk: landslides; Climatic factors; Fire.	Legal risk: the non-recognition of the monument as a heritage; Insecurity and bad attendance; Vandalism; Theft, inadequate processing operations.

Table 1. Classification of risks according to the origin of hazards

Primary hazards	Secondary hazards
Fire ; Inadequate processing operations; Vandalism; Theft.	Geological risk: landslides; Legal risk: the non-recognition of the monument as a heritage; Insecurity and bad attendance; The climatic factors.

Table 2. Risk classification according to the hazard development process.

On the other hand, the matching of the data obtained from the comparative study (the nature of the degradations, the place and the time of their appearance), and the survey of risks, (Place and time of occurrence) is identical. Degradations occur simultaneously with the risks. This situation validates the statement of the hypothesis and confirms that the degradations are generated by the risks.

Finally, the impact of the damage caused after the occurrence of the previous risks has considerably increased the vulnerability of the monument. Beyond the factors of time and the authority's negligence, the degree of vulnerability depends also on the occurrence of risks and the resilience of the monument.

V. CONCLUSION

By way of conclusion, the objective of this study is achieved. The hypothesis is tested and found to be correct, and the study brought a new knowledge about this monument. It showed the inestimable importance of this architectural work for all humankind, revealing its wealth in terms of values. Furthermore, it highlighted the harmful impact of the raised degradations on the integrity and the authenticity of this monument, and its relation with the degree of vulnerability. It has also identified the factors that are at the origin of their appearance, and which are natural and anthropogenic risks, in the course or slow process. Moreover, the results of this research can be used in a practical implication. This study is the preliminary and the fundamental phase in the implementation of a strategy to manage the disaster risks to which this monument is exposed. The identification of risks and their assessment is the first step in the process of disaster risk management. The war memorial of Constantine is one of many other cases that suffer daily from the devastating impact of the risks. Although there have been several international actions to reduce the impact of risks on built

heritage properties, it is still insufficient in the absence of a framework for coordination and exchange of experiences among nations. Therefore, it is highly important that risk managers take charge of built heritage, and dedicate the necessary human and financial resources to ensure its protection from all kinds of hazards, and reduce their harmful impact on its values. Consequently, heritage properties will have a longer life and the future generations will have the opportunity to discover their history.

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