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Title: Stones that Tell Stories

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Abstract

When a historical building, monument, or cultural heritage artifact is affected by a natural or anthropic event, the first reaction is to recover and restore them to maintain our heritage for the next generations. If they are made of stone, some are completely destroyed, but it is often still possible to recognize the facts that made them a cultural item. In many cases, the marks of violent actions are visible on the stone, especially if the impacts came from a non-massive destructive weapon, such as rifle bullet marks or cannon marks from centuries ago, with a lower level of destruction than today. These marks are also part of our heritage and, as a reminder of the history of our cities and countries for generations, it is recommended that they be preserved as a testimony to avoid the repetition of unnecessary violence. This is the aim of the stones that tell stories.

Keywords: Stone-built heritage, natural and anthropic hazards, UNESCO, Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict, stone marks as forensic tools.

Introduction

Stone-built heritage is vulnerable. It includes monuments, buildings, and cultural heritage artifacts. All of them are susceptible to hazards of all kinds, from anthropic to natural. Both can be very destructive, but natural hazards are often inevitable and anthropic hazards can be prevented or stopped before it is too late to face fatal consequences. Once these events have occurred, there is sometimes the possibility of reconstruction. However, sometimes it is better to leave it as it is, as a witness to explain history to future generations and try to avoid its repetition or at least to prevent them from implementing measures based on policies of education and dialogue, especially when the destruction was due to wars and other violent conflicts.

Regarding natural hazards, earthquakes are probably the worst in terms of destruction. In addition, landslides, fires, and volcanic eruptions are terrible events with dramatic consequences. All of them have left land devastated and loss of life and heritage. For example, most of the Seven Wonders of the Ancient World were damaged or destroyed by earthquakes, either recently or centuries ago. Only the Great Pyramids of Giza in Egypt still exist. The Lighthouse of Alexandria, also in Egypt, was heavily damaged by earthquakes in the 10th and 14th centuries. The Colossus of Rhodes was destroyed in the 226 BC earthquake in Rhodes. Temples and pagodas in China, castles and important cultural heritage in Japan, ancient medieval temples in Nepal, mausoleums in Turkey, etc. have also disappeared due to these deadly natural events. As well as numerous churches and towers in Italy; almost the entire city of Lisbon, Portugal, 1755; and the city of Basel, Switzerland, in 1356. In South America, many heritage buildings and vernacular architecture were affected by seismic actions in Guatemala, Haiti, Honduras, Argentina... These are just a few examples, but extensive literature explaining the disappearance of many more due to natural hazards can be found.

Anthropic hazards, like wars, can be devastating and more damaging in terms of affecting society, both physically and emotionally. The consequences have been seen all over the world, although the most precious thing we have, our lives, is what is always irretrievably lost. The First World War (1914-1918) left more than 15 million deaths, only because one country wanted to gain some terrain in different territories. Two coalitions fought across Europe, the Middle East, Africa, the Pacific, and some parts of Asia. As an example of the stone-built heritage affected by this war, the Reims cathedral in France was severely damaged but was soon reconstructed. The Second World War (1939-1945) added millions of deaths and the lesson of the danger of fanaticism. During the Second

World War, many important cultural sites were destroyed by all the countries involved in the fight, not only in Europe (e.g., the Royal Opera House in Valletta, Malta), but also in Asia (e.g., the Hiroshima Prefectural Industrial Promotion Hall, Japan). Clearly, some of those buildings were not specific and intentional targets of bombing, but history has shown that destroying heritage is a way of affecting the soul of the enemy. Respect for heritage was proclaimed at the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict. The international community strengthened these protections in 1977 with protocols additional to the 1949 Geneva Conventions. Article 53 of these protocols prohibits “any acts of hostility directed against the historic monuments, works of art or places of worship which constitute the cultural or spiritual heritage of peoples” (International Committee of the Red Cross (ICRC) database, 1949). According to these international agreements, targeting cultural sites is a war crime, but this has not stopped military groups from doing so. In the last decades, war and terrorist acts specifically targeting heritage have damaged cultural sites in Eastern Europe, the Middle East, and West Africa.

At present, wars cover the front pages of newspapers, such as the invasion of Ukraine by the Russian army. Wars are more destructive today because the war industry is evolving towards more deadly and more damage-producing machines. We should learn how these deadly events lead to the end of otherwise peaceful societies. One way to learn is to see what remains: historic buildings, monuments, and houses built on stone that were affected, but not demolished, by the violence that took place and continues around the world. Today we can see how the Russian army is demolishing some of the most significant buildings in Ukraine, showing no respect for the country’s heritage. The fact that humans can defy cultural heritage to harm other humans is heartbreaking. When Taliban Islamist extremists blew up two giant Buddha sculptures in remote Afghanistan a few years ago, it was not only an act of vandalism, but also an attempt at ethnic cleansing focused on the local Hazaras, for whom the statues were a symbol of their religion. Ideological extremism is a driver of the intentional demolition of cultural property (Isakhan and Zarandona 2018; Campbell et al. 2021 and references therein). Those destroyed Buddhas were once the largest monuments of Buddha in the world and had become a sacred place. They had been carved in situ from porous sandstone on the side of a cliff in the 6th century. Tens of thousands of monks gathered around the statues, as described by the Chinese traveler Xuanzang (629 AD). But in 2001, the Taliban destroyed the Buddhas by bombing them for several weeks. The destruction followed a command

by the “spiritual leader” Mullah Mohammed Omar ordering the destruction of idolatrous statues in Afghanistan. The niche in which the statues once stood has since been stabilized and it is still debated whether they should be rebuilt, because rather than an act of heritage recovery it could be interpreted as an act of covering up history (<https://artsandculture.google.com/story/10-heritage-sites-lost-to-disaster-and-war/kALyuo79hhrkLQ>. Last accessed: 4 May 2023).

The city of Dubrovnik dates back to the 7th century when Romans and Slavs settled on the coast of the Adriatic Sea. It grew to become a major trading power, and in the 19th century Lord Byron gave it the name “Pearl of the Adriatic”. In 1979, UNESCO designated the “Old City” or “Old Town” of Dubrovnik as a World Heritage Site. In 1991 and 1992, the city suffered severe damage during the Siege of Dubrovnik, part of the Yugoslav Wars. More than two-thirds of the buildings in the Old City were hit by projectiles, and others were destroyed by fire. In 2005, the International Criminal Tribunal for the former Yugoslavia sentenced the former Yugoslav general Pavle Strugar to eight years in prison for war crimes, including the destruction of historic monuments in Dubrovnik. The historic City Hall of Sarajevo, known as Vijećnica, dates back to the 1890s (<https://www.wmf.org/project/sarajevo-city-hall>. Last accessed 14 June 2023). Its architecture is inspired by Islamic designs, specifically, the Mamluk architecture that flourished between the 13th and 16th centuries in Cairo, Egypt. In 1949, the city converted it into the National Library. In 1992, the Vijećnica went up in flames during the Siege of Sarajevo, destroying almost two million books. The city worked to restore the Vijećnica, and in 2014, it was reopened to the public. Heritage buildings, such as emblematic towers made of limestone and tuff, were heavily affected and were quickly restored (Causevic et al. 2019). Citizens understand the importance of preserving the vernacular architecture in the context of the changing historical conditions in Bosnia-Herzegovina caused by the devastation of war (Pecar 1999; Husukić and Zejnilović 2017).

In this paper, the author will discuss the importance of preserving the marks that brutality has left on the stone that is part of buildings or monuments using some case studies as examples. In such cases, restoration of the affected parts could have been easy. However, politicians and citizens probably agreed to keep the marks as witnesses to the senselessness of war. The author emphasizes the importance as well of knowing about stones to improve the knowledge of our history.

Research Aim

When a monument, historic building, or cultural artifact is affected by natural and/or anthropic hazards, the instinct is to repair and restore it, so that future generations can enjoy the heritage it represents. However, when the damage is caused by war, violent action, or vandalism, society, together with the different stakeholders, should consider whether the damage is worth preserving. Therefore, the next generations would have a piece of history showing the negative consequences of those aggressive actions, most often accompanied by the loss of human lives. Reflecting on this, the author of this paper addresses the importance of preserving marks on buildings or monuments that suffered anthropic and/or violent actions, using examples that can be studied today and are part of the history of humanity.

Methodology

The main research methods for this paper were observation, review of references and catalogs, and exchange of information with local people and historians at the University of Salamanca. Most of the photographs of the buildings in Salamanca (Spain) and Belfast (Ireland) were taken by the author of this work, but some are from catalogs and were used with permission and others were kindly donated by the photographer Vicente Sierra Puparelli.

Discussion

Sites and Stones

Taking advantage of meetings, workshops, and projects, the author has been able to observe heritage and other artifacts built in stone, but also the effects of violent actions on them. Some of the actions were so devastating that there is nothing left to say today.

A very interesting case to use as a setting for the topic is the city and province of Salamanca. Salamanca is located in the Spanish Northern Plateau, in the region of Castilla y León. The city has a population of about 150,000 inhabitants and the province has about 300,000 people, which are losing inhabitants every year due to the lack of quality employment and the aging of the population. However, Salamanca was a very prosperous place centuries ago and in 1988 the city center was designated a UNESCO World Heritage Site because of the homogeneous architecture, built with the local stones: sandstones, conglomerates, granites, and slates (Pereira 2019). Salamanca was built on top of an opal-cemented conglomerate (Figure 1). Its origins date back to 2,700 years ago, coinciding with the Iron Age. The characteristics of this stone made some parts of the city hilly, and the first settlers, pre-Roman cultures of Vettones and Vacceans, used the hills

to defend the location that would become their permanent dwellings (Figure 2) (Pereira 2019 and references therein).



Figure 1. Cerro de San Vicente. A hill of opal-cemented conglomerate, the origin of the city and today's southern entrance to the city. Picture courtesy of Vicente Sierra Puparelli.



Figure 2. Archaeological excavations at Cerro de San Vicente, where a complex settlement structure was the origin of the city of Salamanca. Picture courtesy of Vicente Sierra Puparelli.

Salamanca is a very particular place: the scene of wars and stone-built heritage that remains to tell stories. Like all Spanish areas, it was the subject of numerous military actions over the centuries. Spain had different governments over the years, including forty

years of dictatorship, but also democratic republics and many different periods of monarchies, under the House of Bourbon. The transitions between them were never smooth, and one of them led to the bloodiest and most unfair civil war in 1936-1939. More than 500,000 people were killed during this war. Some bodies are still to be found in unknown areas along the roads. Spain was “neutral” during the Second World War, from 1939 onwards, mainly because it was exhausted after the massacre of citizens during its civil war. However, the dictator Franco was indebted to the dictator Hitler for the help he had given him during the civil war to devastate parts of Spain that were unwilling to succumb to the dictatorship. Such was the case in Gernika, in the Basque Country, northern Spain (now declared the First Site of Democratic Memory by the Spanish Government: (https://www.boe.es/diario_boe/txt.php?id=BOE-A-2023-10202. Last accessed 4 June 2023)). Favors had to be repaid, and the Spanish dictatorship helped the fascist German government through the preferential sale of tungsten, indispensable for building more cannons to continue the war. The province of Salamanca was one of the main producers of tungsten, together with other areas in western Iberia, including Portugal. The province of Salamanca experienced active mining of tungsten, tin, and copper during and after the Second World War. The price of tungsten was very high, even higher than that of gold, because the Germans needed it for tungsten carbide tools and armor-piercing ammunition, among other things. The allies tried to prevent them from buying tungsten, which was extracted from various mines in Spain and Portugal, by buying it themselves at a better price, so that its value increased dramatically. Tungsten mining in this area was closed down in the 1970s due to falling prices. However, the landscape is full of abandoned mines which are part of the cultural heritage and are linked to a Point of Geological Interest (San Pelayo Orthogneiss, Spanish Geological Service (IGME), 2018). Tungsten brought such benefits to the families that many of them started very basic artisanal excavations all over the place. When the tungsten economy ceased, the excavations were abandoned, and the remains can be found all over the countryside. They are witnesses of a prosperous society in the past and could be used as mining/industrial heritage of the area, although there has been no interest in such communication and outreach activity. The tungsten enrichment was closely related to the tourmaline leucogranite, affected by late Hercynian fluids (Pesquera et al. 2005) that had been quarried for many centuries to build the architectural heritage of the city of Salamanca and its surroundings (Pereira and Cooper 2013; Pereira 2019; Pereira et al. 2014) (Figure 3).



Figure 3. Left: Slab of Martinamor granite in the historical quarry. Right: Martinamor granite in the basal part of a historic building of Salamanca. Scaling in granite is common but does not affect its integrity. Explanation in Pereira 2019.

The use of this granite had been proven to be an excellent material for the preservation of historic buildings. In fact, after the Lisbon earthquake of 1755, in which massive destruction occurred in Portugal, but also in Spain, prominent architects of the time (e.g., Juan de Sagarvinaga, Juan de Alava, Juan Gómez de Mora, Alonso de Covarruvias, and others) insisted on reinforcing the buildings affected by the earthquake only with the ‘good Martinamor granite’. Such was the case of the New Cathedral of Salamanca (built between 16th and 18th centuries; Portal Monge 1988), which today maintains its majesty, although it is leaning as a result of the earthquake. The historic granite quarry closed down a long time ago and the use of good granite was replaced by other granites that were, and are, easier to transport to the city and other areas. However, the old quarry preserves some vestiges of earlier quarrying methods, which are similar to those observed in ancient Egypt and prehistoric sites in Europe and South America (Sousa et al. 2019 and references therein) (Figure 4). A study has recently been carried out on the fracturing pattern of the Martinamor granite in outcrops of the historic quarry to assess the possibility of supplying material for the restoration of heritage monuments (Sousa et al. 2019). From the results it was concluded that only small blocks can be obtained for restoration; therefore, the outcrops should be protected for such purposes. As a reflection, the area of outcrops and ancient quarries, as well as that of mining activities found in the same location, should be preserved as examples of historical extraction techniques and as a remembrance of our geological-materials-based society. Proposals have been suggested for the geoconservation of the site (Figure 4) (Sousa et al. 2019)



Figure 4. Above: Drone images of an abandoned artisanal tungsten mine in Salamanca province. Below: Ancient quarrying marks on Martinamor granite.

The most widely used natural stone in Salamanca construction during the 12th century and afterward was Golden Sandstone, which was a symbol of wealth, but had many drawbacks in terms of water absorption (Pereira 2019 and references therein). Buildings started to weather, from the top, but mainly from the bottom, due to capillarity, and whenever possible, it was replaced with granite in the lower parts. The Golden Sandstone, however, is still the symbol of Salamanca, giving its famous golden glow, and the preservation of historic quarries has been part of the heritage preservation protocol in the province, even though construction is no longer a major business. Nevertheless, any reconstruction in the old part of the city must use this stone.

Another construction material widely used in the historic center of Salamanca was the Salamanca sandstone (Pereira and Cooper 2014; Nespereira et al. 2010). Salamanca sandstone, or opal-cemented conglomerate (Pereira 2019), is also found in the lower ashlar of some buildings and is the most difficult material to replace because all the historic quarries are currently inactive. Salamanca itself is built on this conglomerate (see above), but because of urbanistic reasons, extractions are no longer allowed in and around the city. The opal-cemented conglomerate was a versatile rock used not only for construction. It is common to find abandoned millstones in the countryside, which were

used to grind cereal into flour in the 19th century. In fact, the inhabitants of the area south of Salamanca knew the stone as “millstone” (*piedra de moler* in Spanish, Madoz and Sagasti 1845).

During the Spanish Civil War (1936-1939), many buildings, towns, monuments, etc. were destroyed by German bombing. One of the first violent events of the war took place in Salamanca, as this city was the dictator’s official base. On the first day after the uprising of the rebels, Franco’s army entered the Plaza Mayor, the main square of the city, announcing the takeover of the city by the rebels, but citizens loyal to the republic who were in the square at the time responded with shooting, causing chaos. Franco’s soldiers started shooting back and eleven people were killed, including a little girl. This event is called “the shooting in the Plaza Mayor” (*el tiro en la Plaza*, Delgado-Cruz 2011, in Spanish) and is only remembered by older people. Most of the people from that time are now dead, but a singular story passed by word of mouth: the shooting marked the stones of the Plaza Mayor (Figure 5). The lower part of the columns in the square is made up of granite and people described black-reddish spots due to the impacts from the shooting. Those stains are due to iron-rich microgranular enclaves in the granite. Bullets in granites, or granite-like rocks, produce a very specific effect, as will be shown below and also as Wang et al. (2020) described. However, the science to explain this fact was not available at the time and the emotional feeling of the citizens of Salamanca supported and transmitted to the following generations the unreal theory that somehow sustained the depressive feeling during and after the most dramatic historical event that Spain has ever suffered. Because Salamanca was the dictator’s war base, it was not heavily bombed and little confrontations between the legal Republican army and the insurgent army took place. But other parts of Spain suffered regular confrontations between the two armies, which left an imprint on the stones of buildings. For example, in Madrid, the two armies engaged in a terrible confrontation from July 1936 to March 1939. The School of Medicine of the Complutense University in Madrid was designated “Good of Cultural Interest” (which is the highest level of cultural heritage protection in Spain) by virtue of its central role in the War in 1977. It had been built between 1930 and 1935 and the Spanish Civil War began shortly after the building was completed. The university campus was assaulted between 15 and 18 November 1936 and was part of the battlefield for the rest of the war (1936–1939). Consequently, the building was severely damaged. Between 1941 and 1945 the damaged sections of the building were repaired or rebuilt where necessary by the architect Miguel de Los Santos, incorporating bullet and shrapnel

impacts on all the building façades (Figure 13 in Mol and Gomez-Heras (2018) and references therein), affecting both the granite of the lower part of the building and the brickwork of the upper part. They remain as a remembrance of the terrible Spanish Civil War.



Figure 5. Dark spots in granite, due to small iron-rich enclaves, which were interpreted as marks left by the shooting. Even if the explanation is not true, history allows us to recall a very tragic event at the beginning of the war. Picture courtesy of Vicente Sierra Puparelli. Right: Detail of one of the dark spots. Picture by the author.

However, long before the Spanish Civil War, Spain suffered an invasion by Napoleon troupes. Napoleon, the French emperor, wanted to take over the world and started fighting everywhere, invading as many countries as he thought possible. Some of the battles took place in Salamanca, the city and the province. In fact, the Battle of Arapiles was the beginning of the end of the French invasion, as the English and Portuguese armies, with some help from the Spanish, defeated the invaders Pérez-Ruiz (2021). Arapiles means hills, and each army used one to defend the strategic point. Arapiles is located 5 kilometers south of the city of Salamanca, where there are two inselbergs (Figure 6, left) made of the opal-cemented conglomerate, and now it is also connected to a historic site in the province. This was a strategic location where a big battle took place in 1812 during the Spanish War of Independence (1808–14). It was there that Wellington, in command of the Anglo-Portuguese army and helped by some Spaniards, defeated Napoleon's troops. As a result, these quarries are perfectly preserved, not because of the importance of the stone, but because of their historical relevance. The site is an attraction, mainly for

British tourists, as the terrain is perfectly preserved, and the details of the battle are very well explained in-situ (Pérez Delgado 2002). This victory is marked as a symbol on one of the Arapiles (Figure 6, right). The anniversary is celebrated every 22 July and commemorative poppies are brought to the site (Figure 7). Before the defeat, the French army had destroyed many historic buildings, some of them to use the good stones for fortification and defense. Salamanca has the oldest university in Spain and one of the oldest in Europe, dating back to 1218. It was a city very rich in historic buildings due to the power and wealth of the Catholic Church, the University, and the nobles, who had built numerous churches and palaces. A third of these buildings and historical heritage were lost during the four-year French invasion of Spain (Figure 8). In many other places, the French army also left its cruel legacy, as in Zaragoza, where instead of standing on stone, buildings made of bricks were hit by the artillery and still show the impacts (<https://www.heraldo.es/noticias/aragon/zaragoza/2020/08/02/zaragoza-patrimonio-huella-metralla-1388875.html>. Last accessed May 2023).



Figure 6. Left: The view of Arapiles from the road to Salamanca. Right: A monolith at the top of Arapil Grande commemorates the Battle. Picture by Vicente Sierra Puparelli.



Figure 7. Memorial for the British soldiers who fell at the Battle of Arapiles. Every year, around 22 July, a celebration is held to commemorate the event, when many British people come to Arapiles to learn about the history. Indicators of the battle site are found in the area, and a small interpretation center dedicated to the event can be visited in the village of Arapiles. Picture by Vicente Sierra Puparelli.



Figure 8. Remains of a convent and two university residences, which were demolished by Napoleon's troops. Pictures by the author.

The convent of San Agustín was the home of the most important professors of the University of Salamanca in the 13th century. During the 16th century, important buildings were built for the students of the time. This area was once a Jewish neighborhood, with a very rich cultural heritage. The convent was built in Romanesque style and gave rise to the convent that was destroyed by the French in the 19th century. The building was used by the French army as barracks and in 1812 it was demolished to use the stone for the construction of defensive infrastructures. In the 1980s the area was covered and converted into athletic running tracks. After many years of neglect as a cultural site, in 2022 the local government adapted it to be visited, and included it in a visiting tour, along with Cerro San Vicente and other sites that explain the evolution of the city of Salamanca, including its role during the French War of Independence in 1812. Impressive projectile impacts can still be seen in other buildings and monuments in the province of Salamanca, such as the cathedral of Ciudad Rodrigo, a town in the province of Salamanca on the border between Spain and Portugal, where the fighting between the French army and the British and Portuguese armies was crucial to the victory of the British (Figure 9).



Figure 9. French projectile marks on the façade of the cathedral of Ciudad Rodrigo (Salamanca). The construction of this cathedral began in the 12th century and was completed in the 14th century, in Romanesque style in transition to Gothic. Picture by the author.

Another interesting example linking the stone to violent actions can be seen in the center of Belfast. During the years between the 1960s and the 2000s, Europe experienced numerous nationalist conflicts. The so-called Irish Troubles took place in Northern Ireland but also affected different parts of the Republic of Ireland, England, and Europe (Keefe 2019). While terrorist group ETA targeted specific individuals and the homes and offices of the Civil Guard in Spain, the Troubles focused their violent actions on the streets. Much has been written about the Irish Troubles, but in a nutshell, the Troubles consisted of the clash of Protestants, or Loyalists, who wanted Northern Ireland to remain within the United Kingdom, and Catholics, or Irish nationalists and republicans, who wanted to create a united Ireland (Keefe 2019). The consequences of the Troubles can be imagined by visiting Northern Ireland, where the bombings devastated entire buildings, leaving a painful scar on the streets, and where paintings of the leaders of both sides cover

walls and façades of buildings in cities, mainly in Belfast. One striking feature that remains, and which in the author's opinion should be preserved, maintained, and explained on an in-situ plaque, is a wall affected by bullets from an assault rifle during the shootings (Figure 10). The affected wall belongs to a commercial building in one of the central streets of Belfast. The stone is a nepheline syenite, and the texture of this rock can still be determined to identify the lithology. At the mesoscopic scale, bluish and whitish crystals of potassium feldspars can be distinguished in a mafic matrix in which biotite flakes can also be distinguished. After searching for such a rock in Great Britain, the author found the most plausible option: the "borolanite" from the Aultivullin quarry in the Loch Borralan region of North-Western Scotland. This quarry is no longer in use, but the stones have been described in several scientific papers (e.g., Stephenson 2000; Gillen 2019; Fox and Searle 2021). The author was unable to find any more shooting marks on buildings in the surrounding area or other areas of Belfast. However, when searching on the Internet for "shooting marks" in the context of the Irish Troubles, she came across a very illustrative picture of a woman firing a rifle in a corner where the stone covering the building is very different, probably sandstone, as in the picture it can be seen that the bullet impacts have a different morphology and the volume of material removed from the damaged block is smaller than in the case of the igneous rock (Campbell et al. 2022a). There is a contrast in the crater morphology caused by projectile impacts depending on the nature of the target stone. For example, bullet impacts in limestone produce wider, deeper, and more voluminous impact craters than the same projectiles in sandstone targets (Campbell et al. 2022b). Whereas bullet impact in granite produces roughly circular depressions within highly crushed target material in the center of the crater, with irregular rims caused by fragments spalling from the target and radial cracks with different lengths along the crater rim (Wang et al. 2020). Bullet impacts seem to depend on the lithology of the target, but also the type of projectile and the weapon used for the shot. Therefore, these marks could be used as a forensic tool to investigate criminal and violent actions and bring them to court, including the International Criminal Court in The Hague to prosecute those accused of war crimes, crimes against humanity, and genocides such as those that are currently taking place in various regions (e.g., Ukraine, Syria, Sudan, etc.). Regarding the case of the Irish Troubles, the picture of the IRA woman is an important record of the conflictive times; it is one of the images in the collection of the Irish press photographer Colman Doyle, archived in the National Library of Ireland (Figure 11). Both the marked stone and the photograph are reminders of a time, not so long ago,

that should not return. The unstable political conditions in some countries of the world make us think that wars, and even worse, civil wars, can be triggered at any time if society is not aware that violence destroys our world, including our lives.



Figure 10. Bullet marks on a building façade in the center of Belfast. From the texture and observation of the stone, a syenite can be recognized. Picture by the author



Figure 11. A woman IRA volunteer on active service in West Belfast with an AR18 assault rifle. Doyle, C. (1970). Courtesy of the National Library of Ireland.

Conclusions

Bullet wounds from the executions of Ukrainian soldiers by Russian soldiers can be seen on the walls of Bucha (Ukraine), in an invasion that will leave many dead and much destruction. The walls bear witness to barbarism. Much of the stone-built heritage is destroyed by wars and anthropic actions. The characterization of stones used in stone-built heritage is important because it allows the restoration of buildings, monuments, and artifacts using the same material, which is important to preserve the cultural value. However, when buildings and monuments are damaged, but not destroyed, it may be worth preserving them with the damage to remember the human actions that caused the harm, always accompanied by the loss of human life. From the author's point of view, the damage caused during wars and violent actions is another type of heritage that should be preserved as a reminder of the senselessness of wars. Several papers have addressed the subject from a heritage conservation point of view, as the impact of ballistics can trigger the deterioration of stone-built heritage, as well as the acceleration of the damage curve associated with the development of artillery over the centuries. However, to the author's knowledge, no article has been published on the preservation of damage as an emotional memory for future generations. This paper is intended to be one to follow.

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The author contributed to the study conception and design. Material preparation, data collection and analysis were performed by Dolores Pereira. The first draft of the manuscript was written by Dolores Pereira, who read and approved the final manuscript.

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