

Bridging cultural significance and risk assessment: compared analysis from Conservation Management Plans in Portugal and Cuba (1960-1966)

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Abstract. How can we retain the cultural significance of a 20th-century architectural masterpiece while protecting it from the increasing risks due to climate change? Is climate change protection an ultimate challenge or an opportunity to retain the building's authenticity of 20th-century architecture? This paper discusses this question by comparing two iconic masterpieces of 20th-century architecture, awarded with a "Keeping It Modern" by the Getty Foundation for developing Conservation Management Plans (CMPs). This paper aims to address the relationship between cultural significance and risk assessment through the compared analysis of the CMPs for two emblematic 20th-century masterpieces: the Ocean Swimming Pool in Portugal (Álvaro Siza, 1960-1966) and the National Art Schools of Cuba (Ricardo Porro, Roberto Gottardi and Vittorio Garatti, 1961). The Ocean Swimming Pool is an exposed concrete building with an exceptional setting over the seaside rocks, whose authenticity is now strongly threatened by hazards such as coastal erosion and chloride explosion determined by the sea level rise. In turn, the National Art Schools of Cuba is a unique complex with organic brick shapes. Since the complex is next to the coastline, it has been threatened by the risk of flooding since its foundation, and such risk has been continuously increasing due to the climate change scenario. Both the CMPs are supported by a values-based approach, and comparative analyses will focus specifically on i) cultural significance assessment, ii) risk assessment, iii) policies and actions for climate change adaptation. Hence, the discussion of two

case studies on distinct continents will allow us to further reflect globally on how to preserve cultural significance in the face of the growing threat of climate change.

1. INTRODUCTION

The concept of authenticity has seen major developments in the last century, following its germination in the 19th-century theories of restoration. The Venice Charter (ICOMOS, 1964) culminates the vivid debate after the World Wars and consists of one of the most important documents of consensus until the present day. However, this doctrinal tradition expresses mainly a Eurocentric perspective, favouring the material authenticity of the buildings, ensembles and sites. The Nara Document (ICOMOS, 1994) argues against this Occidentalism perspective, claiming for the preservation of the intangible values (Choay, 1994) and expanding the concept of authenticity towards several attributes such as (i) form and design, (ii) materials and substance, (iii) use and function, (iv) location and setting, (v) spirit and feeling, (vi) traditions, techniques and management systems.

Also, conservation of modern architecture poses new conceptual challenges in the discussion of the concept of authenticity. While recent decades have seen a greater trend towards restoring the original design appearance, prioritising 'formal authenticity' rather the 'material authenticity' (Ferreira, 2023a), of which the intervention in Le Corbusier's Ville Savoye is one example among many others, some other cases reflect an evolution in the thinking and the praxis in this field in order to favour the 'progressive authenticity' (Jerome, 2008) defended by Pamela Jerome for the conservation of the Guggenheim Museum in New York.

Cultural significance, intended as the result of the attributes (what) and the values (why) is directly related to authenticity. Hence, the preservation of tangible and intangible attributes determines the authenticity of a site, being the basis of heritage listing and the definition of conservation strategies (Veldpaus, 2015).

However, these concepts have not always evolved in curated and rational manner. They are entangled into a dialectic between processes of selection, losses and natural transformation of the society, which still keep affecting the authenticity of cultural heritage. Climate change, as a contemporary growing threat, is determining how humanity is going to live in the next generations and the safeguarding of modern architecture should not be

absent from the debate, especially on preparing for adaptation measures and risk management.

There is a vast literature addressing the cultural significance of heritage sites, as well as climate change adaptation. However, very few studies interrelate cultural significance and risk assessment, briefly pointing out the vulnerability of local people and, thus, the values threatened by climate change (Kodirekkala, 2018), and the importance of disaster preparation under cultural significance framework (Marrion, 2014) to monitor and reduce their negative impacts.

In this context, this paper aims to contribute to foster the analysis of the relationship between cultural significance and climate change adaptation through the compared analysis of the CMPs of two emblematic 20th-century masterpieces: the Ocean Swimming Pool in Portugal (Álvaro Siza, 1960-1966) and the National Art Schools of Cuba (Ricardo Porro, Roberto Gottardi and Vittorio Garatti, 1961).

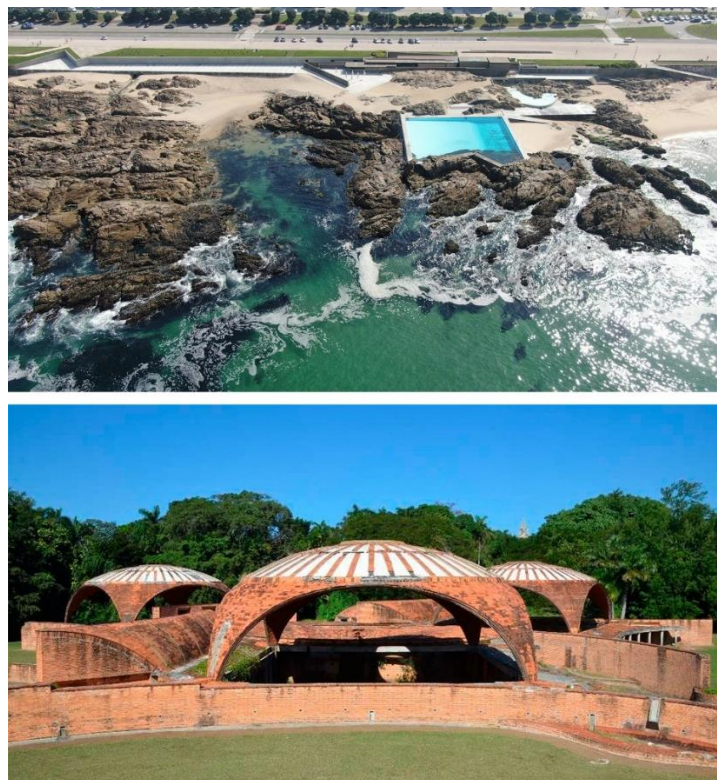


Figure 1. Above, Ocean Swimming Pool (Alvaro Siza, 1960-66). Photo: Pixel, 2021; Below, National Art Schools of Cuba (Ricardo Porro, Roberto Gottardi and Vittorio Garatti, 1961). Photo: 2019.

2. METHODOLOGY

The case studies presented in this article are framed within the “Keeping It Modern” (KIM) initiative promoted by the Getty Foundation, dedicated to globally safeguarding and preserving modern architecture. Between 2014 and 2020, 77 grant projects of outstanding architectural significance were developed, focused on the preparation of Conservation Management Plans while improving research, and training to build best practices for a still-emerging field.

Conservation Management Plans are a multi-staged process that allows and promotes the active preservation of buildings and places (Kerr, 2013). Anchored in the Burra Charter (ICOMOS Australia, 1999), they provide a cyclical framework in which heritage conservation is carried out by evolving communities’ values to foster integrated management. In a holistic approach, the closer the relation of the various rights-holders in assessing significance and developing policies for achieving common agreements on maintaining it, the more efficient conservation is achieved (Mason, 2002).

The Burra Charter methodology for Conservation Planning is based on values-based approach supported by the following steps i) understand the place; ii) assess cultural significance; iii) identify all factors and issues; iv) develop policy; v) prepare a management plan; vi) implement the management plan; vii) monitor the results, and review the plan (ICOMOS Australia, 2013). This paper will focus on the following steps ii) and iii) namely on the methodology for cultural significance and risk assessment, and on their possible relations and impacts.

3. COMPARATIVE ANALYSIS

3.1. Cultural Significance

The Ocean Swimming Pool was designed by the Portuguese architect Álvaro Siza (Pritzker Prize, 1992) between 1960 and 1966 (with later additions until 1973) for the coastal town of Leça da Palmeira, to the north of Porto, Portugal. In this early work, Siza adopted expressively modern technology and abstract neoplastic language, building a succession of walls in reinforced concrete over the seaside rocks. The building is currently listed as a National Monument (since 2011) and is included in the “Ensemble of Álvaro Siza’s Architectural Works” in the World Heritage Tentative List (2017).

The Ocean Swimming Pool is one of Álvaro Siza’s most

internationally recognized works, marking a turning point in his career by expressing a tectonic shift from regionalist inspiration towards more abstract design and innovative constructive solutions. Also, the building has been in full use for almost sixty years, becoming a social and cultural landmark for the local communities.

Methodology for cultural significance assessment of the Ocean Swimming Pool by Álvaro Siza resulted from the cross-analysis of different methods and tools: i) document analysis, ii) archival research and literature review; iii) participatory strategies (surveys, interviews, workshops, webinars, social media analysis, among others); iv) field work. These activities engaged a wide spectrum of actors (visitors, staff, managers, users, experts, children, students, virtual community, among others) providing a broad perspective on the different values and attributes of the site, allowing the definition of different categories of cultural significance (social, economic, political, historic, aesthetic, scientific, age and ecological) and a map of levels of significance (exceptional, high, moderate, some) (Figure 2, above).

Cuba's National Art Schools (NAS) were built just after Castro's revolution (1961-64) on a design by young architects Ricardo Porro, Vittorio Garatti, and Roberto Gottardi. NAS translated the will for social renewal into an innovative architecture where opening, dialogue, equality, and freedom resulted in a synthesis of art, construction, and landscape. The five buildings have hosted an original model in education based on the integrated teaching of different forms of art to which each building is devoted: visual arts, drama, music, dance, and ballet. Although independent, these iconic buildings were all made using the same materials (bricks, concrete, ceramic tiles) and techniques (domes and vaults) and perfectly integrated within Havana's former golf course.

The NAS were included in the 100 Most Endangered Sites by the WMF (2000), in the Unesco Tentative List (2003), and the National Register of Monuments (2010). However, they have been mainly studied from a critical and social point of view so far, not yet with the aim of being sustainably preserved and managed, with the risk of losing or jeopardizing both the educational model and modernist architecture which made the NAS unique. To prevent this risk, a comprehensive CMP was completed from 2018 to 2020 by Politecnico di Milano, Parma University, Assorestauro (Italy) Universidad de las Artes (Cuba), Princeton University (USA).

Methodology for cultural significance assessment of the NAS resulted from the cross-analysis of different methods and tools: better understating of constructive history and conservation needs, comparative discussion among different stakeholders (national/international, designers, owner, users). The results have allowed the topic to overcome some persistent misunderstandings in the critical and historiographical approach to the NAS and to better assess the complex's significance on solid foundations (Asali et al. 2021)

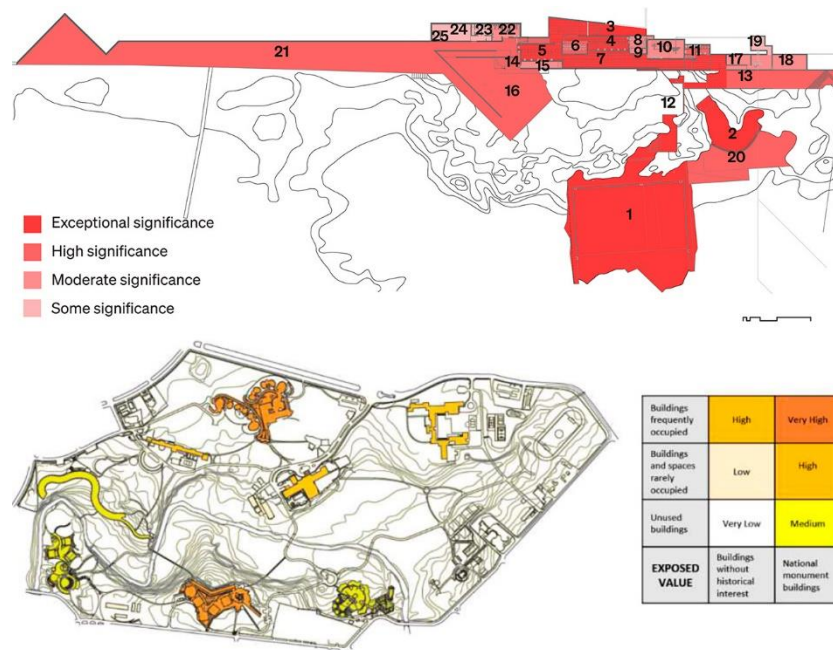


Figure 2. Above, Ocean Swimming Pool Levels of Significance Map. Source: Ferreira (ed.), 2023b: 91). Below, National Art Schools of Cuba Exposed Value Map. Source: Del Curto (ed.), 2019: 439.

3.2. Risk Assessment

The methodology that was followed for risk, vulnerability and hazard identification for the Ocean Swimming Pool considers that risk can be defined as the potential negative impacts in the asset under assessment due to the occurrence of a threatening event (hazard), which can be of natural or anthropogenic classification. These negative impacts can be seen as the result of the dynamic interaction between the hazard and existing vulnerabilities (e.g. physical, social, economic or environmental vulnerabilities) which represent the susceptibility of the asset to

the damaging effects of the hazard, combined with a lack of ability to cope with those impacts.

Given the location of the Ocean Swimming Pool, the more relevant natural hazards were found to be storm surges and chloride action. In addition, given their relation with climate change, events such as sea level rise were also considered.

A storm surge is an abnormal rise of seawater over the predicted astronomical tide level that storms generate, which temporarily increase the sea level by decreasing atmospheric pressure, already visible overtime, (Figure 3, at left). Due to their morphology, low and sandy coasts are particularly sensitive to this extreme hydrodynamic phenomenon, causing coastal erosion processes.

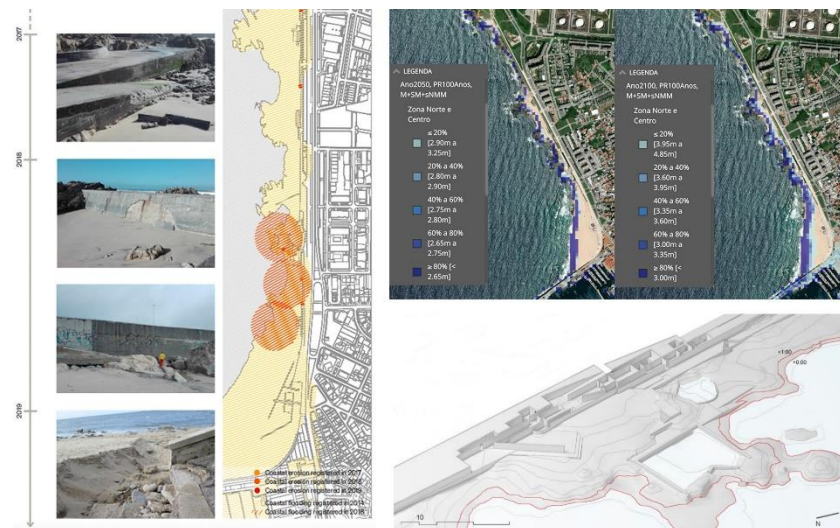


Figure 3. Risk Analysis of Ocean Swimming Pool: at left, flooding and coastal erosion occurrence. Source: Ferreira, 2023: 159; at right, coastal flood scenarios for 2100. Source: Ferreira, 2023: 155.

In the context of climate change and its effects, the world's oceans will warm and ice melting will continue, leading to a likely sea level rise of 0.19 m and 0.23 m until 2050. Beyond 2050, there is medium confidence estimate a likely rise between 0.44 m and 0.77 m. The specific sea level rise projections for the west coast of Portugal (Figure 3, right), point to permanent tide submersion levels of 0.44 m in 2050 and of 1.15 m in 2100 (see the tridimensional simulation). The specific tide submersion scenarios for 2050 and 2100 indicate that both swimming pools are likely to be submerged for 9 hours a year.

Given the location and past history of the Ocean Swimming Pool, vandalism, incorrect or improper use, and neglect or lack of maintenance were the three types of anthropogenic hazards also considered in the risk assessment.

As regarding the Cuba's National Art Schools, after documentation and before conservation, the CMP focused on protection of the NAS from the main risk affecting the complex, that is the flood risk due to river Quibù crossing the complex and frequently flooding the modernist building.

Given these premises, defining the hydraulic risk assessment and mitigation was a priority for the CMP far before any concerns about stability, preservation or reuse. The risk-assessment process involved a multidisciplinary team including conservation architects and hydraulic engineers from Politecnico di Milano, Italy and from the National Institute "Recurso Idraulico", Cuba. Given the striking dimension of the complex the research was based on a GIS platform and a large and multi-scale database (Garzulino et al., 2021).

The research focused on Vittorio Garatti's Ballet School as it is the most at risk among the five iconic buildings. The result is a digital model predicting the risk of flooding affecting each building by means of different flood scenarios with return periods of 5, 10, 20, and 100 years (Figure 4).



Figure 4. Hydrogeological risk analysis: up, river Quibù route near the Vittorio Garatti's Ballet School; below, the result of the analysis about the flood depth with a return scenario of 100 years.

The model also sets some solutions to mitigate such risks both in the short-term and in the long perspective taking into account three levels: vulnerability, exposed value and damage (Stucchi et alii, 2021). Whether temporary, lightweight, or permanent, affordable flood protection structures can be equally effective. The project shows that conducting a relatively inexpensive hydraulic investigation can assist flood modelling and risk assessment for conservation projects involving historically significant sites. This information can guide the selection of adaptation and risk reduction measures across Cuba's coastal areas, addressing the impact of rising sea levels and extreme storms due to transient climate change.

3.3. Bridging Cultural Significance and Risk Assessment

Both Cultural Significance and Risk Assessment cannot be inert operations in a management plan. Their cross-examination is an important step to prevent different “loss scenarios”, with permanent deterioration of cultural heritage. This procedure helps to engage managers in visualizing vulnerability states of the property, enforcing and prompting risk preparedness measures.

In the case of the Ocean Swimming Pool, hazards were associated with cultural significance values identified in early stages of the Conservation Management Plan preparation, according to Table 1. The table presents a summary of the previously described vulnerability scenarios along with a severity classification using three levels: LOW, MEDIUM and HIGH. This classification considers both the severity of the physical damage that can occur as well as the severity of the impact on the cultural values that can be affected. A severity level classified as LOW means that the physical damage is either negligible or small enough to be easily reparable, while the impacts to cultural values are also expected to be negligible. A severity level classified as MEDIUM means that the physical damage is not negligible and re-pairing it will also involve non-negligible costs. This damage will also have relevant impacts to cultural values, but these are also expected to be recoverable after the damage repair. A severity level classified as HIGH means that the physical damage is expected to be significant and may not be fully repairable. As such, the impacts to cultural values in this case may not be recoverable.

Affected cultural values	Hazard	Vulnerability	Severity
All	Sea level rise	Permanent submersion	HIGH
Aesthetic	Increase of atmospheric carbon dioxide	Acceleration of concrete carbonatation and rebar corrosion	MEDIUM
Aesthetic	Chloride action	Acceleration of rebar corrosion	MEDIUM-HIGH
Economic Aesthetic	Storm surge	Building damage Infrastructural damage	HIGH
Economic Aesthetic	Vandalism	Graffiti Copper theft	MEDIUM-LOW
Economic	Misuse	Equipment damage	MEDIUM-LOW
Economic Aesthetic	Lack of maintenance	Acceleration of the asset's degradation	MEDIUM-HIGH

Table 1. Summary of the selected vulnerability scenarios. Source: Ferreira, 2023b: 158.

Sea level rise is a high risk hazard affecting all values, because it implies the permanent submersion of the asset. Climate change, though, is a permanent issue of concern due to the loss of fruition of the property in the future.

As the table also shows, different hazards may affect aesthetic, aesthetic and economic, or only economic values.

In the first case, the increase of atmospheric carbon dioxide, as also a result of climate change, will accelerate concrete carbonation, leading to the corrosion of steel rebars which can cause cracking, spalling and the weakening of reinforced concrete elements. Also, the permanent exposure to the maritime environment, which is richer in chlorides, accelerates the corrosion of steel rebars which can cause cracking, spalling and the weakening of reinforced concrete elements.

In the second case, the moving force of storm surge may result in building damage. Direct exposure to seawater will seriously compromise the normal operating conditions of infrastructural

networks due to direct contact with water, chlorides or due to water-suspended sediments that can clog the hydraulic and filtering systems. In turn, graffiti have a negative impact on the asset's image and may be particularly difficult to remove since the asset was built mainly with unprotected materials (exposed concrete). Copper theft (the roof cladding or the water pipes) affect the normal operating conditions of the asset and might lead to serious consequences if not promptly addressed.

Finally, the misuse of the facilities might lead to equipment damage and determine the need for unexpected repairs and additional costs. The lack of regular and appropriate maintenance interventions will accelerate the degradation of the asset.

The discussion between cultural significance and risk assessment of the NAS contributed to the overall critical rethinking of this modernist masterpiece and highlighted some fragilities of that utopian and visionary project. Table 2 reflects about potential damage today.

Targets (today)	Exposed Value	Vulnerability	Damage (today)
School of modern and folkloric dance	Very High	Medium	Substantial
School of plastic art	Very High	Medium	Substantial
Student house	High	Medium	Considerable
New school of music	High	Medium	Considerable
Rectorate	High	Medium	Considerable
School of ballet	Medium	High	Considerable
School of music	Medium	High	Considerable
School of dramatic arts	Medium	Medium	Considerable
Warehouses and archives	Low	Medium	Minor
Technical networks, road and infrastructures	Low	Low	Minor

Table 2. Damage ranking (today). Source: Del Curto (ed)., 2019: 442.

More precisely, our analysis has highlighted how the current fragility in the face of the pressure of climate change derives entirely from the choices made during the twentieth century, at different scales: 1) the modern embankments built to urbanize the mouth of the Quibù river near the of coastline prevent the water from flowing freely into the ocean when the tide rises; 2) in the 1930s, the designers of the golf course modified the natural

course of the river within the complex, which was diverted in three points to create scenic meanders. They beautified that tropical country club and made room for holes No. 8 and 9, the same area where Vittorio Garatti designed the Ballet School in the Sixties; 3) Vittorio Garatti was fascinated by that landscape and wanted to romantically "hide" his masterpiece right in that depressed meander so that the building is only visible from above, with the iconic architectural promenade above the large brick domes, which imitate the shape of the Algarrobo trees. As a result, the Ballet School is surrounded by the river on three sides like a peninsula and has been exposed to the risk of flooding since the time of its construction.

In conclusion, the high exposure of the NAS to the risk of flooding is due both to the growing threat of climate change (increasing hazard) and to the high vulnerability of the buildings (especially the Vittorio Garatti Ballet School) which was determined by the design choices of the sixties. The challenge for the conservation project will therefore be to increase the level of protection, without damaging the architectural and landscape qualities that makes this iconic complex unique.



Figure 5. 28th, January 2019. Vittorio Garatti Ballet School after a storm. Photo: Andrea Garzulino, 2019.

4. CONCLUSIONS

Values-based approach defines cultural significance as the guiding framework of conservation policies. Hence, as this paper intends to demonstrate and according to the Burra Charter

Conservation Planning methodology, there must be an assessment of the vulnerabilities affecting the cultural significance, as well as the definition of policies to mitigate their impact and retain the values within a careful management of change.

This study acknowledges the lack of glossaries, literature, or specific frameworks for risk assessment of 20th century heritage. Also, there are missing studies relating cultural significance and risk assessment, for which this study intends to present a contribution.

The cases presented distinct geographic, geomorphologic, typological and technological features, which have determined different hazards and impacts on built heritage. Future works may be related with comparative analysis through common frameworks and relating risks with different typologies, construction technologies and geomorphological contexts.

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BIOGRAPHIES

Teresa Cunha Ferreira holds a degree at the Faculty of Architecture of the University of Porto (FAUP) and an European PhD at the Polytechnic of Milan, concluded in 2009. Since 2003, she has professional experience in heritage public offices in Porto (DGEMN-DREM), among other design, management or consultancy works. Since 2007, she has been teaching at the University of Minho (2009-2017) and FAUP (since 2012). In 2009, she joined the Centre for Studies in Architecture and Urbanism (CEAU) of FAUP, where she is a Principal Investigator (since 2021) and coordinates the UNESCO Chair as well as several funded research projects such as '*Keeping It Modern*: Álvaro Siza, Ocean Swimming Pool. Funded by the Getty Foundation.

Davide Del Curto is an architect and Full Professor of architectural preservation at Politecnico di Milano, Dept. of Architecture and Urban Studies, where he coordinates the Analysis and Built Heritage

Diagnostics Laboratory. His research focuses on preventive conservation and 20th-century architecture. He was responsible for national and international research projects conserving and managing historic buildings. Within the Keeping It Modern initiative, he contributed to the CMP for Giancarlo De Carlo's "Collegi" of Urbino University (2015-18) and coordinated the CMP for the National Art Schools of Cuba (2018-20).

Pedro Freitas has a professional degree in Architect and Urbanism from the University of São Paulo (2000-2006). He holds a Master (2010-2012) and PhD (2014-2018) in Architecture, Technology and City from the University of Campinas, degrees obtained conveying experiences on conservation projects and architectural surveys both in public and private sectors. In 2018, he became an Assistant Professor in the Department of Architecture and Urbanism of the Federal University of Sergipe (UFS). Since 2022, he is a member of the UNESCO Chair and an integrated member of the Center for Studies in Architecture and Urbanism (CEAU) of FAUP, where he develops a post-doctorate research on education of contextual methods for architectural intervention, while participating in different projects related with the preservation and safeguarding of modern architecture.

Andrea Garzulino has a PhD in Architecture, Urban Planning, Conservation of living places and landscape (2015) and is a Research Fellow at the Polytechnic of Milan (since 2014). For five years he has held research grants in the ICAR/19 field and collaborates with the TeCMARCH laboratories (since 2009) and LADC (since 2019) of the Department of Architecture and Urban Studies of the Polytechnic of Milan. He has participated in international research groups (Keeping it Modern, Getty Foundation 2019; EuropeAid Eritrea 2017) and national (Castelseprio 2016; Milano Archeologica 2015) and is the scientific director of research on the analysis, documentation and management of archaeological areas (Tarquinia Project 2014-2019; Myanmar 2014). Rui Fernandes Póvoas Professor at the Faculty of Architecture of the University of Porto (FAUP).

Presently, it is member of, both, the Representatives Council and the Scientific Board of FAUP, exercising also, at the same institution, the functions of director of the Center of Studies of the Faculty of Architecture (CEFA) and, in the academic plan, of director of the Architectural Heritage advanced studies course (third cycle of studies). Invited speaker at several scientific events and member of different scientific organizations and committees, namely, ICOMOS – Portugal (member of the National Advisory Council), ICOMOS International Scientific Committee on Shared Built Heritage (ICOMOS ISC–SBH) and DOCOMOMO – International Specialist Committee on Technology – co-chair (ISC/T), among others.

