SIZATLAS

Filling the Gaps for World Heritage

Edited by
Soraya Monteiro Genin
Teresa Cunha Ferreira
Mariana Correia

ARCHITECTURAL CONSERVATION AT THE WATER'S EDGE:

PROTECTING ÁLVARO SIZA VIEIRA BUILDING HERITAGE

TELMA RIBEIRO, SUSANA MILÃO, ISABEL CLARA NEVES, ANA LIMA,
LUÍS PAULO PACHECO
CIAUD–UPT & DAMG, Universidade Portucalense, Porto, Portugal

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The preservation of twentieth-century architectural heritage, particularly in the case of structures located near water or coastal areas, faces distinct challenges according to the state of the art. Driven by the emergence of innovative materials and construction techniques, architecture of the period experienced significant advances and setbacks which also impacted heritage conservation.

The recognition of the scientific status of modern architectural heritage conservation went hand in hand with the establishment of several key organizations and pivotal publications. In the 1990s, DOCOMOMO's study, conducted at the invitation of ICOMOS, proposed a tentative list of Modern Movement properties for the World Heritage List, emphasizing a comprehensive definition of authenticity that involves idea, form, construction, detailing and materials. The formation of the C20 group in the UK in 1992, followed by the establishment of ISC20 under ICOMOS, further consolidated efforts to preserve twentieth-century architectural heritage. The 2003 UNESCO publication *Identification and Documentation of Modern Heritage* was instrumental in contextualizing this topic on a global scale (UNESCO 2003).

To effectively preserve twentieth-century heritage, particularly in coastal or water-adjacent locations, maintenance challenges must be addressed through a detailed surveillance of three primary themes:

1 Architectural Significance and Authorship: investigating the unique ideas, forms and concepts through detailed architectural analysis. This includes understanding the original intent and creative vision of the architects, which is vital for informed conservation efforts (Jokilehto 2018; Macdonald 2003).

2 Construction Techniques and Material Characterization: examining the construction methods, detailing, and materials used in these buildings. This analysis is essential to identify the specific preservation needs of modernist structures, which often employ innovative and experimental materials and techniques not seen in earlier architectural periods (Macdonald and Gonçalves, 2020).

3 Environmental Challenges and Conservation Strategies: discussing the impact of water and extreme environmental conditions on these structures and the corresponding maintenance efforts. Water is a significant agent of material degradation, particularly for concrete structures exposed to marine and freshwater environments. The degradation mechanisms include physical processes like freeze-thaw cycles, mechanical wear from erosion and abrasion, chemical processes such as sulphate attack, carbonation,

calcium leaching, and chloride-induced corrosion, as well as biological influences and structural overloading. The corrosion of steel reinforcement in concrete is a particularly pressing issue, posing a major challenge to the conservation of twentieth-century built heritage (Harrison 1999; Macdonald 2019).

Several UNESCO World Heritage Sites exemplify the complexities of conserving twentieth-century architecture in coastal or water-adjacent environments. The Sydney Opera House, a modernist masterpiece located on the harbour, faces constant exposure to marine conditions that threaten its structural integrity and facade. Fallingwater, designed by Frank Lloyd Wright, is famously built over a waterfall, presenting unique challenges in preserving its reinforced concrete structure against moisture and biological growth. Villa Le Lac by Le Corbusier, situated on the Lake Geneva Shore Path, requires specific strategies to mitigate the impact of the lake environment on its structure. The Pampulha Modern Ensemble by Oscar Niemeyer, located around an artificial lake in Belo Horizonte, Brazil, also exemplifies the interaction of modernist architecture with water, posing specific preservation challenges.

UNESCO has implemented a range of conservation techniques and preventive measures tailored to the specific challenges faced by each of the previously mentioned examples. For instance, the Sydney Opera House has been the object of comprehensive conservation efforts focusing on the application of a waterproofing membrane and regular monitoring of the effects of saltwater exposure and humidity. Similarly, Fallingwater has benefited from structural reinforcement techniques, including the use of waterproofing membranes and improved drainage systems to mitigate water infiltration and prevent further degradation of its cantilevered terraces. The Villa Le Lac has incorporated climate control measures and enhanced protective coatings on exterior surfaces to safeguard against moisture and environmental pollutants. Finally, at the Pampulha Modern Ensemble, UNESCO has supported the restoration of concrete surfaces and the introduction of water management systems to control the impact of the surrounding lake on the buildings.

These conservation strategies, emphasising regular maintenance, environmental monitoring and the use of modern materials that align with the original designs offer practical examples that can be adapted to the preservation of Álvaro Siza Vieira's works that are located close to water environments.

Within the scope of the SizaAtlas project, it is possible to identify two groups of Siza's buildings associated with water in different forms, which allows to categorise the associated problems, namely:

a) Water associated to a catastrophic event — buildings in areas with high risk of storms and floods.

b) Water in lasting contact with buildings — buildings close to fresh and salt water.

Group A includes the following works: Pavilion of Portugal for Expo Lisbon (1995–1998); Portugal Pavilion for Expo Hannover (1999–2000), co-authored with Souto Moura and later translated to Mondego Green Park, Coimbra (2003); Olympic Village Meteorology Centre, Barcelona (1989–1992); Iberê Camargo Foundation, Brazil (1998–2008). In this group, we highlight the Nadir Afonso Museum, Chaves (2003–2016) and the Municipal Library of Viana do Castelo (2000–2008) for their palafitte morphotypology. In this case, space conception took into account specific typological and morphological considerations, safeguarding possible flooding.

In the case of group B there is a subgroup of buildings in direct confrontation with fresh water (river and lake) such as the Paper Mill Museum in Leiria (2003–2009) and Building on the Water, China (2010–2014), the latter co-authored with Carlos Castanheira. The sub-group of buildings facing salted water includes the Ocean Swimming Pool (1960–1966) and Boa Nova Tea House (1958, 1959–1963).

All these iconic buildings face continuous challenges from marine and riverine conditions, requiring innovative preservation techniques to protect their structural and aesthetic integrity. Moreover, all these examples have been subjected to conservation interventions due to the degradation related to water interaction with the building materials.

This is definitely a challenging topic, and it is crucial to tailor conservation strategies to protect twentieth-century architectural heritage in varied water-related contexts. By addressing these themes, the preservation of twentieth-century architectural heritage, especially those exposed to the unique challenges posed by proximity to water and coastal conditions, can be approached with a deeper understanding and more effective strategies. This comprehensive approach aims at ensuring that the innovative and culturally significant structures of the twentieth-century will be maintained for the appreciation of future generations.

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