

MECHANICAL ENGINEERING | PHYSICS |
PRESERVATION OF THE ARCHITECTURAL
HERITAGE | STRUCTURAL, SEISMIC
AND GEOTECHNICAL ENGINEERING |
URBAN PLANNING, DESIGN AND
POLICY | AEROSPACE ENGINEERING |
ARCHITECTURE, BUILT ENVIRONMENT
AND CONSTRUCTION ENGINEERING |
ARCHITECTURAL, URBAN AND INTERIOR
DESIGN | BIOENGINEERING | DATA ANALYTICS
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ELECTRICAL ENGINEERING | ENERGY AND
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ENVIRONMENTAL AND INFRASTRUCTURE
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CHEMICAL ENGINEERING | INFORMATION
TECHNOLOGY | MANAGEMENT ENGINEERING
| MATERIALS ENGINEERING | MATHEMATICAL
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Chair:
Prof.
Mariacristina Giambruno

DOCTORAL PROGRAM IN PRESERVATION OF THE ARCHITECTURAL HERITAGE

The Doctorate Course in “Preservation of the Architectural Heritage” was first held at Milan-based Politecnico back in 1983.

The PhD program focuses its attention to some currently crucial themes for the preservation, conservation, management and valorization of Architectural Heritage.

Starting from the fundamental topics of knowledge, preservation, design and intervention, the PhD program takes care of the most important and urgent problems affecting the built Heritage and Cultural Landscapes: the fragility and the abandonment of historic marginal areas; the climate change and its effects on the built environment; the improper pressure of mass tourism on our historic settlements and sites of cultural interest, the needs for a wider social involvement in the field also through appropriate ICT mediums, the management and the use of architectural Heritage.

The conservation of Architectural Heritage is, in fact, a strategic field as well as one of the main important resources for worldwide economy and for a sustainable future in different areas of the world.

The team of professors, promoting and participating in the debate about these matters on a national and international scale, will thus deal with a broad range of issues requiring strong and real multi-disciplinary approach.

In addition to the professors of architectural restoration, history of architecture and structural strengthening of the Politecnico di Milano, the Faculty Board includes representatives from other well-known universities and research institutes (Università IUAV, Venezia; Università di Genova; Università degli Studi di Bergamo; ICVBC -CNR); they collaborate actively in the teaching and research activities.

The ultimate purpose of the Faculty Board not only resides in broadening the experiences that the PhD candidates acquire over the first three years of the course, where they have the opportunity to interact with scholars from different backgrounds; it chiefly aims at providing the PhD candidates with a unique training experience in the Italian panorama, so far unparalleled also in domains other than the preservation and restoration of the cultural heritage. Such context investigates the synergies and responses to the modern themes of cultural heritage protection.

The PhD programme is meant as the place where theorization, methodology, investigation into the most significant chapters of the protection of historic architectural and cultural heritage are connected to complex, challenging operating research themes, on-site and lab experimentation of analytical and diagnostic stages.

The relationship with Italian Ministero per i beni e le attività culturali e il turismo - Mibact has been definitely fruitful, especially when we consider that many among the best PhDs in Preservation of Architectural Heritage have been hired as officers and executives to the above ministry; recently (February 2018) twelve PhD from the PAH Programme won the competitive exam to become officers in the Ministry of Cultural Heritage

Teaching aims

The Faculty Board organization allows to investigate and share extremely relevant, up-to-date topics that, architectural heritage being the high spot of research, describe the complex domain of preservation, a strategic field and, at the same time, one of the chief resources of the Italian economy and future.

Being a mix of differentiated research, experimentation and operating methods, the PhD programme provides the candidate with a rich and very interesting experience. The on-going contact with the breakthroughs from studies and research carried out in Italian and international contexts and the will to promote joint projects are fostered through expanding the network of relations the university entertain with other universities and research centres in different geographic areas of the world. In this regard, over the past 5 years the PhD programme in Preservation of the Architectural Heritage has been committed to promoting and coordinating inter-doctoral courses contributed by foreign professors from different European countries.

Coursework

The PhD Programmes and the PhD School activate teaching forms of different kind and credit value, including courses, seminars, project workshops, laboratories. Teaching activities both cover the basic research issues (problems, theories, methods), which represent the founding element of the PhD

programme and clearly identify its cultural position, and deepening in a specialist way some research issues connected with the problems developed in the theses.

Within this plan, different experiences are organized in order to get PhD candidates in touch with study and research developed in Italian and International context.

Visits to important restoration site are organized, such as the ones to the area in the central part of Italy damaged by the earthquakes (Amatrice Accumoli, etc.); to the Procuratie, Rialto Bridge and the Palazzo Vendramin Calergi in Venice; to the Colosseo in Rome under intervention of maintenance (with ISCR, formerly Istituto Centrale del Restauro), to the Sanctuary of Vicoforte (in collaboration with Politecnico di Torino); to the underwater archaeological site in Baia (Napoli) in relation to the ISCR project “Restoring Unerwater”. Three workshops organized as interdoctoral program in Sulmona, in Nicosia (Cyprus) and in Elbasan (Albania) allowed students to gain experience in national and international contexts with highly topical issues.

The second and the third years are aimed at personal study and research for the PhD thesis.

The activities undertaken during the second and third year also include attendance of workshops, seminars, international meetings related to individual research, with great attention to conferences wherein PhD candidates present the results, even partial, of their research theses.

Research organization and topics

Educational activities are related to research either under way or at an early stage of development, some of which addresses major monumental structures and some of the most renowned sites of the world. This aspect increases the technical characteristics and will make PhD immediately competitive at the European level.

To the aim of their thesis research, PhD candidates have the opportunity to rely on facilities and laboratories, both inside and outside the University, the breadth and width of which provides them with a crucial support to the aim of acquiring “competence for highly qualified research activities” in the domain of cultural heritage protection.

In this connection, the PhD programme deems to carry on the long - standing collaboration with the ICVBC-CNR (the Institute for the Preservation and Enhancement of Cultural Heritage).

As for the thesis research, candidates thus have the opportunity to address and investigate in-depth the wide-ranging themes connected to heritage knowledge and preservation broadly meant, such as advanced methods of investigation.

The multi-disciplinary nature of the doctoral courses, encouraged in the framework of the PhD programme since its establishment, equally values the fundamental contribution of historical research and its methods; at the same time it features innovative, pioneering themes: impacts of climate change on architectural heritage and cultural landscapes; Inner Areas: census, conservation and re-use of Architectural Heritage; strategic approaches for the preservation; social involvement and Communities engagement in the protection and management of their Heritage; Impact of mass tourism on architectural heritage and cultural landscapes; cultural and sustainable tourism policies and practices; Architectural Heritage at risk in seismic or in conflict areas; Architectural Heritage and Cultural Landscapes in Countries in transition; Cultural Heritage and Economic Evaluation.

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THE ROCK-CUT MONUMENTS OF NAQSH-E RUSTAM: A CONTRIBUTION TO UNDERSTANDING THE SITE EVOLUTION AND THE DECAY PHENOMENA THROUGH HISTORICAL AND PRESENT SURVEYS

Sahar Ahmadinezhad - Supervisor: Prof. Andrea Pane

Co-Supervisors: Dr. Antonio Sansonetti, Prof. Rasool Vatandoust

The PhD thesis aimed to investigate the evolutions of decay mechanisms of stone material in architectural heritage. Such evolutions resulting from human-induced changes in climatic and environmental conditions have manifested themselves in the visible forms of increased and intensified decay patterns which imposed a new challenge in architectural conservation. While the historical resources have considerable potential to assist the research about this challenge, there is still a gap between the scientific experimental studies and historical investigations on the records related to stone monuments and sites to frame the evolution of the decay patterns in a more comprehensive way. Therefore, the objective of this research is to develop a timelining method for the evaluation of the changes in decay patterns in the rock-relief monuments with a focus on the historical site of Naqsh-e Rostam (Marvdasht county, Iran) and to highlight the relationship between the timeline of the changes in decay patterns with the historical sequence of events in the greater area surrounding the site. The site was selected as a focal point as it has been visited frequently

by travelers and pioneer archaeologists who described the site's characteristics and its surrounding context using drawings, photos, and even experimental methods. Therefore, the study is structured in 3 phases. The first phase comprises the analyses of the potential influence of the surrounding territory on the site (macro-scale) with a focus on potential risk factors such as air pollution caused by agricultural activities and urbanization processes. The second phase includes the analysis of the historical documentation with particular attention to the analysis of photographic documents and historical drawings of the rock reliefs and the changes on their surfaces (mesoscale). The third phase, accomplished using instrumental analyses, includes an evaluation of the samples taken from the rock material and the surface decay products (Micro-scale). Based on the results of investigations at the mesoscale, the tomb of Xerxes was selected for instrumental analyses since the timeline of decay evolutions for the rocks of this tomb was less disrupted in comparison to other elements of the site of Naqsh-e Rostam. The timelines of changes in each of the three scales of

the study were developed for evaluation of the increased decay and identification of the potential impact of the human-induced environmental changes. Regarding the macroscale, the research highlighted increasing air pollution in the broader area surrounding the site, in four historical phases including the land reforms after the 1910s, the industrialization in the 1930s, the second period of land reform in the 1960s, and finally after the new rural planning started since the 1980s. On the other hand, the historical investigations at the mesoscale showed observable changes in decay phenomena, i.e., the emergence of the black crusts and highly intensified surface erosion, on rock reliefs of the tomb of Xerxes in the period between the 1930s and the recent period. The increased decay was quantified by the indexes of decay (DIIin and DIIprog) using a method of image processing developed for this study. Only a few indications of decay problems in the tomb of Xerxes were identified in the surveyed historical documents about the earlier periods. The estimations based on modeling the air pollution levels show that the concentrations of pollutants, including CO₂, CH₄, VOCs, PM_{2.5},

NO_x, SO₂, and NH₃ have been highly increased during the 1970s as a result of intensified agricultural land use, by the establishment of the sugar factory and later with other agri-food industrial units. However, the intersection of the historical data on the macro-scale with the data collected on the micro-scale demonstrated that the decay phenomena such as black crusts have been formed later. The comparison of early scanning electron microscope (SEM) images from the mid-1970s with those taken from new rock samples showed that the types of weathering effects on the stone surface in the 1970s

were mainly erosion caused by mild acidic solutions, which could be similar to the carbonate rocks' decay in unpolluted areas. The generation of black crust and highly intensified surface erosion in the new samples are linked to the pollution from the petrochemical industry and the urban population increase in Marvdasht county started in the 1980s. Moreover, regarding the historical records of climate changes, a significant reduction of the annual precipitations since 2006 along with changes in the Standardized Precipitation Index (SPI) and wind speed were highlighted. Although the

impacts of these climatic factors in stone decay have been almost negligible in comparison to the highly increased effect of the local air pollution, climate changes with fluctuations of precipitation in long term will intensify the deterioration processes. The problems in the integration of the results from the three different scales of the investigation were discussed in the final part of the thesis. The potentials of the timelining method, as the output of this research, to assist in the prediction of future decay changes and its strengths and limitations compared to other approaches was assessed as a tool for studying similar rock-cut architecture sites, especially in long-term conservation planning for the rock-cut sites in Marvdasht county and in the scope of the extension of the boundaries of the world heritage site of Persepolis to cover the site of Naqsh-e Rostam.



Fig. 1 - Rock reliefs on the tomb of Xerxes, Naqsh-e Rostam, Iran

MATERIAL LEGACIES OF THE COLD WAR IN ITALY (1947-1989): IDENTIFICATION AND MAPPING OF DECOMMISSIONED MILITARY SITES. PROSPECTS ON PRESERVATION AND REUSE

Simona Bravaglieri – Supervisor: Prof. Carolina Di Biase

Co-Supervisors: Prof. Donatella Rita Fiorino, Prof. Mattias Legnér

The research explores the decommissioned military sites and artefacts built during the Cold War in Italy, such as nuclear weapon stores, communication and radar systems, military airfields, aviation and naval sites, and missile defence structures. The objectives are the identification and knowledge of military complexes built between 1947 and 1989 that the armed forces decommissioned, listing and mapping them and describing the selected systems' architectural, technological and functional features. The sites under study, especially those connected with the missiles and communications, are part of peculiar systems for the Cold War, become obsolete after a few years of use and have been decommissioned, in some cases, before the end of the period of contention between the two blocks. These include missile sites (Jupiter, Nike, Hawk, Cruise), telecommunications sites (Ace High Tropo Scatter), research and communications sites (test sites, NATO headquarters).

The analysis of the sites related to the Cold War highlights the strict connection between military strategy, architecture

and technology they had to host. This systemic architecture, tailored as the infrastructure around specific bellicose aims and operations, was used for a concise cycle of use, after which it became obsolete. The site systems described were chosen primarily for this impermanence because of the close link between the instrument of war as a site and the technology adopted, and the site's lack of adaptability to rapid changes in war technology. In addition to the problematic adaptability to rapidly and irreversibly changing military technologies, the short history of use of most of these sites also offers evidence of how difficult it would be to put them back into the current defence strategy of the armed forces today due to the effect that decades of neglect have had on the structures. This situation opens an engaging reflection on how to preserve, reuse, or notify these material testimonies, which used to contain the most dangerous weapons in circulation.

Studying Italian Cold War military within the field of history of architecture and architectural preservation in a systematic way could help

overcome the peculiarity of the segmented military forces organisation, which does not facilitate the integration into systematic knowledge. Studies on the military matter must be approached by taking into account the fragmented nature of the organisation of the armed forces. Starting from the analysis, the problematisation of the lack of reuse and protection strategies for the material traces of this part of history is a possible outcome. With the recognition of these areas as specific territorial and economic resources, the research presents the need for strategies in their reuse and questions whether some of these artefacts can be considered heritage and should therefore be preserved in the future. At the moment, it is not possible to protect any of these buildings in the context of the Italian legislative framework since they were built less than 70 years ago.

The risk is to lose the sites and related knowledge before it could be possible to preserve them, which resides both in the material remains and in the memory of the people who have worked and served in these places. A reflection on the protection of the sites would have more

success when the generation who has lived during the Cold War has not disappeared yet. It is vital to record these intangible features, part of the memory of one site, with its material traces, quality and characters, and open a discussion on the criteria for the recognition for protection in the framework of Italian law. The archival records regarding the mentioned complexes are still only partly accessible due to the temporal proximity of the events related to the sites and the dispersion of the sources between entities of competence. Therefore, gathering all the possible information and documentation, tangible and intangible, by recording the most important sites is essential. First, the analysis and description of the architecture of these systems are crucial for their knowledge.

On-site recognition of Cold War decommissioned military sites in Italy has supported the research to understand which organisations and individuals are interested in these complexes and the difficulties in managing and valorising them. A few of the visited sites are part of both successful and unsuccessful local initiatives that have brought attention to their reuse and led

to some experts' study of their history. The common feature of these (proposed or carried out) openings is that they are initiatives from private or local authorities and do not involve safeguarding from Italian legislation. The reuse of the Cold War sites described as necessary for their survival does not always help enhance their values and sometimes implies the loss of tangible and intangible elements of a site.

The awareness of the meanings and historical, technical and use interests around these sites will be raised following several methodological steps:

- the state-of-art analysis of Cold War architecture studies and the identification, preservation and reuse project initiated in other international contexts. The analysis of two specific cases has been carried out, opening the exploration of contemporary but very different approaches to the identification of Sweden and the United Kingdom;
- the Italian historical and strategical context analysis during the period and the resulting deployment of sites on the Italian territory;
- the study of the classification

localisation of the military sites, the types of building use, and their decommissioning process is recorded using comparative categories and systems inventory sheets;

- the description of five site systems exemplary of the systemic architecture peculiar to missile and communication sites. The sites have been chosen because of their connection to international and national historical events, their presence in published bibliography, and, above all because they represent a whole group of sites with specific technology for the Cold War Italian Strategy;
- some policies and international experiences for the recognition of interest are analysed to discuss principles, objectives and steps towards the preservation or reuse of these complexes.

THE SEISMIC PROTECTION OF THE BUILT ARCHITECTURAL HERITAGE – THE ORGANISATION OF KNOWLEDGE AS A PREPARATION TO RISK

Enrica Brusa – Supervisor: Prof. Claudio Chesi

Co-Supervisor: Prof. Stefano Della Torre

This work is the result of an interdisciplinary research, developed jointly between the PhD courses “Preservation of the Architectural Heritage” (DASTU) and “Architecture, Built Environment and Construction Engineering” (DABC) of Politecnico di Milano. The research, supported by a specific interdisciplinary grant entitled: “Heritage assets at risk. Prevention modalities and benefits”, treats the matter of the protection of the Built Heritage from the seismic risk, focusing in particular on the emergency phase that follows an earthquake.

One of the principal aims of the research was to highlight some criteria that would be able to improve the promptness of the reaction carried out by the public Agencies in order to protect the built heritage from a worsening of the damage – i.e. the one provoked by the aftershocks. For this reason, the research deals in particular with the topic of the *technical countermeasures* that are taken during a seismic emergency on the damaged built heritage. The general question that guided the development of the research has been: ‘After an earthquake, is it possible and how to improve the promptness of the securing interventions on

the built heritage, aiming to limit additional damage produced by the aftershocks?’.

The ability to promptly install technical countermeasures on historical buildings damaged by an earthquake represents an important issue in relation to the protection of the built heritage from the progress of damage, reducing the risk of further material losses due to the occurrence of aftershocks. This kind of intervention, also known in the Risk analysis as the *coping capacity* of a society, can be a valid resource in order to stop the progress of damage on the built heritage, if well managed and promptly executed. Moreover, it can also provide for the lack of previous works aiming at vulnerability reduction in historical buildings. Indeed, despite these latter constitute the more appropriate solution to improve the seismic resistance of buildings, it is often difficult to realize them, mainly due to their high costs or to the presence of specific constraints related to the building cultural value. Regarding the protection of the cultural heritage, different public Agencies are involved in the emergency operations – such as the National Fire Brigade (NFB), the Civil Protection Department

(CPD) and the Ministry of Culture (MiC). For this reason, also the cooperation capability of the specialised operators, together with knowledge availability and specific technical solutions developed to protect the cultural heritage, constitutes an important issue for assuring a satisfactory level of the securing emergency activities.

The analysis of the operations that during an emergency are performed by the public Agencies for the protection of the built heritage represents an innovative topic, which has permitted to highlight the main features of a complex scenario, characterized by different regional laws and rules, by various exigences of the involved specialists and by dishomogenous local experiences with respect to the emergency interventions. Furthermore, it has revealed the possibility to interpret emergency interventions as a particular phase of the more ample procedure of damage prevention, since they can be seen as a specific activity to prevent the occurrence of further damage. The thesis has analyzed the topic of the seismic emergency that followed the earthquake occurred in Central Italy in 2016, since that experience has well

demonstrated the damage increase that can be provoked by the aftershocks, especially in those buildings that hadn't been secured following the first ground shock.

Another interesting element was due to the involvement of different Regions, each one characterized by specific forms of emergency procedures and expertise. Additionally, the areas had been affected by previous seismic emergencies, like the one that followed the earthquake of Umbria and Marche in 1997, and the one that followed the earthquake of L'Aquila in 2009. The research has analyzed the technical countermeasures that were realized by the NFB onto the built heritage during the first two months of the emergency phase. This time corresponds to the interval between the earthquake of 24th August 2016 and the main aftershocks, which happened at the end of October 2016. Meaningful case studies have been identified in the Regions of Umbria, Marche and Lazio, thanks

to the help of the NFB and of the local offices of the Ministry of Culture.

The research has proved the importance of promptly realizing technical countermeasures for securing the built heritage damaged by an earthquake in order to minimize further material losses produced by the aftershocks. It has also highlighted that the good interoperability level among technicians and public officers positively influenced the realization of the emergency activities, assuring a prompt reaction and successful coordination during the field operations, in addition to fulfilling the needs of both the conservation of the historic buildings and the safety of the operators.

One of the main aims of the PhD thesis has consisted in the attempt to focus the elements that still need to be improved during the execution of technical countermeasures, as for instance the effective sharing of the

available knowledge among all the involved operators. Indeed, the possibility to access available data on historic buildings is a main issue in the process of understanding the structural behaviour and to properly designing countermeasures. Nevertheless, these data are usually fragmented, as they are kept in different archives and not digitalized. Information, therefore, is hardly accessible during an emergency, with no possibility to be rapidly consulted. Thus, a relevant improvement could be achieved through a wide communication action and a deep exchange of existing data among the Agencies that are involved in the emergency phase, through a widespread organisation of knowledge, anytime respecting their peculiar requirements. Moreover, achieving such a kind of exchange will allow for the realization of a better *interoperability* among the public Agencies that participate to the implementation of technical countermeasures on the damaged built heritage, also allowing for a better *preparation* to promptly face the seismic risk and to reduce the occurrence of further damage eventually produced by aftershocks. One of the innovative aspects highlighted in the thesis comes from considering the improvement in the organization of the available knowledge of single historic buildings as a valid instrument of prevention. This instrument is also necessary in order to reach a more effective preparation to risk.



Fig. 1 - The church of 'Madonna del Sole' in Capodacqua, Arquata del Tronto (AP). The technical countermeasures executed in October 2016 increased the residual capacity of the building, reducing the progress of damage due to the aftershocks

THE 'NECESSARY LIVING' BETWEEN THE TWO WORLD WARS. LIFE AND FATE OF SOCIAL HOUSING BUILT BY THE IACP OF MILAN

Elia Zenoni - Supervisor: Prof. Francesca Albani

Co-Supervisor: Prof. Carolina Di Biase

Between the first and second postwar periods, the Istituto Autonomo Case Popolari of Milan (IACPM) built more than 40 neighbourhoods, for a total of almost 26,000 accommodations. Of these many architectures - which have been considered 'historical' for some time now - only a part, albeit large, is now included within the public building heritage available to the city. Some neighbourhoods no longer exist today, and others were built from the beginning to be sold. Still, others have been partly alienated because of later and more recent policies. In the same way, not all the 'surviving' heritage has reached the present time in the same conditions. Some of these places have undergone major transformations and attention, while others have fallen into oblivion and abandonment. Likewise, the various narratives that have interested them - in some cases so superabundant as to have made them famous - have strongly conditioned their perception both for good and for bad.

The inspiring intent of this work was therefore not to limit itself to a mere process - albeit important and necessary - of

historiographical updating relating to the constructive and cultural event of the Milanese IACP between the two World Wars: an operation which - thanks to the use of archival sources, even unpublished - has made it possible to shed light on various shadow areas that still characterized the IACPM history. Nor was the goal to limit oneself to a glossy - albeit necessary - photograph of the state of the art in which these architectures are today, carried out thanks to many inspections and field checks. The deeper intent was, if anything, to tell what happened between the two thresholds of the origin and destiny of Milanese public housing; that is what - with an explicitly organic metaphor - has been called life.

The whole discourse was therefore made to rotate around the life of four of these districts: the *Solari* (1925-27), the *Stadera* (ex-*XXVIII Ottobre*, 1927-29), the *Trecca* (1933-38), and the *Lorenteggio* (ex-*Renzo and Mario Mina*, 1938-44). The selection of case studies comes from the choice of paying particular attention to those accommodations - originally defined as *ultrapopolari* or *popolarissime* - built and forcibly

placed on the market - through direct or indirect action - by the public authorities to meet an unmet demand of very low-cost accommodations triggered by the great housing crisis that exploded in Europe at the end of the First World War and by urban renewal policies conducted by the regime in Italy. These architectures have indeed represented an unprecedented policy of differentiation of users inaugurated in the twenty years of fascism, but whose discriminatory results have survived in part within the most recent housing policies.

The material history of this built heritage - thanks also to its ambiguous position between a traditional and established construction practice and the first design influences of modern architecture - reveals many qualities and undoubted potential, albeit today challenged by dynamics and narratives that threaten its permanence. For instance, a privileged look at the material characteristics of these architectures has made it possible to dispel a myth: that of architectures built at low cost and therefore not designed to last long, as the experiences of the modern movement have

often taught us. On the other hand, it has been shown how most of the IACPM construction choices including a general reticence towards experimental construction techniques were oriented towards achieving solid and reliable architecture over time.

In the core part of the work, starting from a census of what is left of these architectures, an attempt is made to reconstruct both the events that led to the disappearance of some of them with some attention to the demolition process of the *Case Minime* as well as the strategies that have instead allowed them to remain, albeit with very different outcomes and through very different processes, as the vicissitudes of the *Stadera* and *Solari* neighbourhoods have shown. It was precisely from this analysis that it appeared how, while an almost spontaneous process of dissolution of the differences that had characterized the origin of these architectures took place making them increasingly

homogeneous in taking charge of the city's housing discomfort a contrary but not homogeneous motion proposed a substantially discriminatory reading of some of its portions. Historiographic judgement, media perception, and institutional choices overlapped and followed one another in dismembering into many paths the compactness, apparent homogeneity, and repetitiveness of this built heritage. But if between the 1970s and 1990s when these places faced their worst crisis a path matured that wanted to give them value and pushed for their preservation mixing social, cultural, and economic instances today, that we are witnessing renewed attention made up of speeches but also of notable incoming resources, these instances risk being called into question and this heritage could be irreparably defeated.

Indeed, these historic public housing districts risk being erased because they are considered purely economic and therefore, today, consumer

assets: expendable objects, commodities of exchange in the development logic of the contemporary metropolis. The traditional protection instruments linked to the constraints of the Code of Cultural Heritage are, in the case of Milan's large public neighbourhoods, an essentially 'solution. Most of them have already been declared to be of no cultural interest and thus removed from the context of the ministerial protection list. This does not simply reflect a lack of recognition of the historical and cultural value of these architectures, but also an awareness of the substantial inadequacy of traditional listing systems to profitably fit into the dynamics of such a built heritage. To achieve the goal of preserving these architectures however, it would be necessary to overcome the binary logic that sees the instruments of institutional protection and listing juggling between the too broad and vague boundaries of the landscape and the too narrow and arbitrary outline of individual architectural events. Within this dualism, there seems to be no space for large residential districts, for which today there is a lack of instruments capable of triggering a fruitful and necessary dialogue between material, economic and cultural instances. Fig.



Fig.1 - One of the outdoor spaces in the Solari district, photo by the author (2020)