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O1 INTELLECTUAL OUTPUT
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Best practice guidelines / report

REVIEW



BEST PRACTICES

In Educating Sustainability
and Heritage

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VLADAN DJOKIĆ
MARIA PHILOKYPROU
ANA NIKEZIĆ
EMANUELA SORBO
KONSTANTINOS SAKANTAMIS
MAR LOREN-MÉNDEZ

PARTNERS:

The University of Belgrade - Faculty of Architecture // Serbia
Università IUAV di Venezia // Italy
The University of Cyprus // Cyprus
The Aristotle University of Thessaloniki // Greece
The University of Seville // Spain

**Enhancing of Heritage Awareness and
Sustainability of Built Environment in
Architectural and Urban Design Higher Education**



CONTRIBUTORS:
HERSUS CONSORTIUM MEMBERS

UB-FA
Vladan Djokić
Ana Radivojević
Ana Nikezić
Jelena Živković
Nataša Ćuković Ignjatović
Milica Milojević
Jelena Ristić Trajković
Aleksandra Milovanović
Aleksandra Đorđević
Mladen Pešić
Bojana Zeković
Tamara Popović
Nevena Lukić

IUAV
Emanuela Sorbo
Enrico Anguillari
Sofia Tonello

UCY
Maria Philokyprou
Aimilios Michael
Panayiota Pyla
Odysseas Kontovourkis
Maria Nodarakis
Theodora Hadjipetrou
Stavroula Thravalou
Andreas Savvides

AUTH
Konstantinos Sakantamis
Alkmini Paka
Kleoniki Axarli
Maria Doussi
Angeliki Chatzidimitriou
Sofoklis Kotsopoulos

USE
Mar Loren-Méndez
Marta García-Casasola
Daniel Pinzón-Ayala
Julia Rey Pérez
José Peral López
María F. Carrascal-Pérez
Enrique Larive
Roberto F. Alonso-Jiménez
María Alvarez de los Corrales

EXTERNAL COLLABORATORS:

Remorker architects
Dejan Miljković, Jovan Mitrović, mr Branko Pavić
Mihailo Timotijevic, Miroslava Petrovic-Balubdzic
Chryso Herakleus, University of Cyprus
Fabrizio Antonelli, The Iuav University of Venice
Municipality of Thessaloniki
Municipality of Pavlos Melas
State Museum of Modern Greek Culture
Miguel Hernández and Esther López, PhD architects. AF6 Arquitectura
Luis Machuca, PhD architect. Luis Machuca y Asociados
Miguel Angel Ramos Puertollano, Quality Surveyor. Antonio Jiménez Torrecillas architectural firm
Francisco Reina Fernández-Trujillo, architect
Victoria Segura Raya, Architect, Responsible of geo urban data IDE Sevilla, Department of Sustainability and Urban Innovation, Sevilla Town Council

IMPRESUM

EDITORIAL BOARD:

Vladan Djokić, Maria Philokyprou,
Ana Nikezić, Emanuela Sorbo,
Konstantinos Sakantamis, Mar Loren-
Méndez / *HERSUS Scientific Coordinators*

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REVIEW: Best Practices In Educating Sustainability and Heritage

IO1 lead: Maria Philokyprou, UCY

HERSUS Project leader: Vladan Djokić, UBFA

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In current time, as a society, we face multiple challenges and dualities: enable growth yet prevent disruption of the existing urban structure, give a response to the needs of the present without compromising the ability of future generations to meet their own needs, preserve the unique architectural and urban heritage that testifies about our past yet innovate within the architectural and urban design for our present.

With the architectural profession's ongoing stratification between architectural theory and praxis, future architects must take both critical and constructive positions regarding future spatial development. A contemporary built environment will have to balance heritage awareness and sustainable approaches while creating new shapes and conditions for new realities. In this complex scenario, a profile of future architects is under question, along with the institutions' structures and programs that are educating them.

Bearing this in mind, HERSUS partners strive to reassess these dualities in the educational process, hence enhancing and testing innovative and creative teaching practices in the field of sustainability of the built heritage. The project strives to improve educators' and researchers' competence and motivation to include curricula elements that will have tangible results, preparing architectural students and educators to become real actors of the environmental change.

Previously mentioned challenges require vital research and continuous improvement of curricular and extracurricular activities in higher education. To have a successful outcome, they must be transnationally carried out and need to achieve a balance between theory (research and education) and practice (institutional and professional). Both locally and globally alternative practices are developed parallel to institutional architectural education, creating

different methodologies and built structures. Within this arena, HERSUS research project is striving to explore new perspectives and challenges regarding the teaching-learning of heritage awareness and sustainability.

This publication presents the results of the first four months of the project and is structured in three main parts:

- Built Architectural and Urban projects (20 projects, four from each of the five partner organizations)
- Pedagogical and Educational Models (20 courses, four from each of the five partner organizations)
- Influence of National Policies on the Sustainability of Heritage (one report per each partner organization)

The applied approach balanced between different geographies, cultures, and scales provides new insight into the complexity of the definition of heritage in the contemporary context, testifying that heritage transposes from an urban artifact to the urban landscape. It confirms the increasing complexity of thinking about urban and architectural heritage, representing a growing challenge for both researchers and educators to implement such topics in curricula.

The prepared publication's quality was contributed by architectural offices and individuals from five different countries, public bodies, and students whose works were used to illustrate the specific course methodologies.

Vladan Djokić, HERSUS project leader

EDITORS PERSPECTIVES

THE UNIVERSITY OF BELGRADE -
FACULTY OF ARCHITECTURE



The work on IO1 was mainly shaped by the contributors' endeavour to interconnect often opposed notions of theory and practice, academic and professional institutions.

When considering sustainability and heritage in the regional context, the University of Belgrade – Faculty of Architecture (UB-FA) continuously tends to enhance and test innovative teaching practices in the field of education. This includes various types of courses from lectures to workshops, from design projects to written thesis and research methodology courses, from compulsory to elective courses, including all study levels: undergraduate, graduate, and doctoral. In the Review, UB-FA (Serbia) will present the courses (1) *Green Construction- Lessons of the past*, (2) *Among Scales: Programming the New Modernity of Belgrade*, (3) *Design Studio 06U*, and (4) *Energy Rehabilitation and certification of existing buildings – case study*. The course types vary from lectures and theoretical projects to workshops, studio design, and seminars. The courses were selected with the intention to present the competence and motivation of educators and researchers to include curricula elements that will have tangible results and a very environmentally sensitive relationship with built heritage and sustainability concepts. In this context, such an approach aims to spread the importance of built heritage within the new generation of students while considering the entire environment, humans, and society in general, preparing students and educators to become real actors of the environmental change. In regard to case studies of built projects, UB-FA presented projects that reflect the development of new intercultural approaches to heritage and the exceptional strength and will of the architects and urban planners to preserve and enhance architectural and urban heritage qualities on different scales. The selected case

studies are (1) *Conservation and Reuse of the Nebojsa Tower in the City of Belgrade and Founding of a Museum and a Cultural Centre*, (2) *Office Building Bulevar 79*, (3) *Museum of Coal Mining and Centre of Industrial Heritage*, and (4) *Detailed Regulation Plan for the Old core of Zemun*. The case studies are located in urban (2) and historical centres (1,4) in Belgrade or mountain areas in Serbia (3). The current use varies between cultural (1, 3), office (2), and mix-use with central activities (4). Sustainability issues, such as effective re-use and enabled social activity, upgrading energy efficiency, and traditional materials, are involved in the projects. Evaluation of energy efficiency and public competition were used as tools for the implementation of the new uses. The projects were rewarded and nominated on several occasions and were disseminated through exhibitions, presentations, publications, and workshops.

In the review of the current state concerned with heritage in national and sectoral policies, UBFA particularly highlighted the lack of (1) representation (regarding lack of guidelines, evaluation, and research methods, recognition of various urban heritage types (industrial, vernacular, modernistic, intangible)), and (2) mechanisms for financing the revitalization and funding in general (a national budget that decreases in time)), identified within *Strategy of Sustainable Urban Development of the Republic of Serbia Until 2030*. The abovementioned problems were identified as the leading causes for continuous and evident devastation of cultural heritage. Additional issues are perceived in unbalanced and fragmented spatial interventions, often illegal, affecting the loss of unique spatial patterns and relations.

UNIVERSITÀ IUAV DI VENEZIA



The current analysis of the educational programmes and courses in IUAV highlights how Sustainability and Cultural Heritage are enhanced by architectural and urban master degrees and postgraduate programmes. IUAV programmes and courses offer

different and complementary approaches regarding the themes of Sustainability. IUAV offers broad programmes, such as Master Degree Programme in Architecture (thought in Italian), Master Degree Programme in Architecture (thought in English), City and Environment: Planning and Policies and IUAV - Specialisation School in Architectural and Landscape Heritage, postgraduate program, IUAV-SSIBAP

The detailed examination of the specific courses highlights how Heritage awareness has been traditionally present in the IUAV approach to the training and design process (research, documentation, values assessment, design strategies, and proposal). IUAV educational offer presents two different kinds of courses, focused on Sustainability and Cultural Heritage: the monodisciplinary courses and the integrated workshops. The monodisciplinary courses aim to give the students the tools to approach architectural problems with the autonomy of judgment improved by the knowledge of the historical and theoretical frame. The integrated workshops offer learning opportunities and work experience under the direct supervision of high-profile professionals and teachers. The master's degree thesis provides a turning point to the students' educational path, where all the main issues related to Heritage and Sustainability could be managed and detailed. Accordingly, IUAV presented courses (1) *Integrated Design Lab – Focus 3: Regeneration and Conservation of Historic Buildings and Environments*, (2) *Studio 2: Sustainable City Project, City, and Environment: Planning and Policies in Italian*, (3) *Restoration Theories and Techniques*, and (4) *Elements of applied petrography: Deterioration of stone and lithoid materials*. This list expresses the different IUAV approaches on Sustainability, dealing not only with environmental or technological issues but also with social, economic, and cultural aspects. For example, specific design proposals on cultural Heritage express Sustainability in terms of re-use and improvement of a part of a city or a building. The team's four local case studies are adherent to the IUAV approach towards Heritage and Sustainability. The choice aims to underline the idea of Sustainability

concerning environmental or technological issues and social, economic, and cultural aspects. All the case studies are in historical contexts and/or areas with high cultural value (Venice, Verona urban area, Venzone, Treviso Sile River natural park). The re-use of ancient buildings to create new social and cultural values is coherent to the European Commission's argument about the recent years' soil thematic strategy. Accordingly, IUAV decided to present (1) *Punta della Dogana, Venezia (VE)*, (2) *Ex-bakery of Santa Marta area, Verona (VR)*, (3) *Rebuilding program of Venzone, Venzone (UD)*, and (4) *H-Farm project, Roncade (TV)*. Having in mind the long tradition of architecture and urban design in Italy and its relation to the regulatory framework, IUAV presented the timeline of the leading national urban, landscape, and environmental legal provisions regarding cultural / built heritage and sustainable development. The report focuses on the period from 1860 to 2020, highlighting the primary laws, establishing key institutions, adopting the main Charters and Decrees that strongly influenced the interlink between heritage and Sustainability.

THE UNIVERSITY OF CYPRUS



The University of Cyprus (UCY) starts from the premise that teaching sustainability issues in the context of heritage architecture courses require a multidisciplinary approach, highlighting the challenge to find a balance between addressing architectural heritage for future societies while covering contemporary socio-economic needs and sustainable requirements.

This is the general concept of the postgraduate programs *Conservation and Restoration of Historic Buildings and Sites* and *Energy Technologies and Sustainable Design* at the University of Cyprus.

These two programs provide necessary knowledge and expertise in conserving built heritage and building energy performance, respectively. They both address, to a lesser or greater extent, issues of social, economic, environmental, and cultural

sustainability associated with the built environment, and they also promote the enhancement of digital competences and skills for supporting a competent work profile, as an emerging demand of our society. The challenge for the two programs' future development is to further address the connection between cultural heritage and sustainable development. This will develop critical thinking on how current and future practitioners may preserve, use and develop architectural, cultural heritage in a sustainable way and how cultural heritage may be used as a driving force for sustainable development.

As an integral segment of above mention programs, UCY (Cyprus) presented the courses (1) *Architecture and the Critical History of Ecology*, (2) *History and Critical Theory of Conservation*, (3) *Special Topics on Recording and Documenting Buildings and Sites*, and (4) *Capstone Design Project*. The selected courses types include lectures, theoretical projects, workshops, studio design, compulsory and elective. The courses' purposes and objectives are related to both sustainability and cultural heritage, while learning outcomes are related to the theory and practice, providing students with the necessary knowledge and expertise in building energy performance and the conservation of built heritage, respectively. The selected courses address aspects of sustainability and promote cultural heritage as a base for environmental development.

UCY (Cyprus) presented the case studies (1) *Urban Landscape Rehabilitation in Lefkara*, (2) *HYBUILD Aglantzia Case Study*, (3) *Restoration of Alexandros Dimitriou Tower*, and (4) *Restoration of a vernacular dwelling in Kapedes*. All the buildings selected are listed, predominantly with residential use. Selected case studies were used as a basis to address specific sustainability issues, such as the rehabilitation of traditional rural settlements, the use of traditional materials and techniques, the incorporation of renewable energy systems in the structures, and the upgrading of the energy efficiency of the buildings. UCY has shown tremendous effort both to select relevant cases and explain in detail tools and technologies used in the project documentation, design,

and construction, such as data loggers for monitoring temperature and moisture, weather stations for monitoring external and internal environmental conditions.

In the report on the Influence of national policies on the sustainability of heritage from the architectural and urban design perspective, UCY highlighted the efforts in Cyprus in the previous 40 years regarding architectural heritage preservation and documentation through the implementation of the Laws, Acts, Inventories, and Programs.

The UCY specifically emphasizes the efforts in protecting and improving vernacular architecture. The current philosophy and practice in the field of architectural conservation aim to establish a balance between necessary functional modification and improvements of energy efficiency (retrofitting) while safeguarding the special architectural and historical aspects of heritage buildings or sites.

THE ARISTOTLE UNIVERSITY OF THESSALONIKI



This introvert examination focused on sustainability and cultural heritage themes, allowing mapping of curricula and course structures of the educational methodologies and material employed.

AUTH's contribution analyzed three programs of study offered at the school that are relevant to the themes of sustainability and cultural heritage, such as (1) *the 5yr Integrated M.Arch Program*, (2) *the Program of Postgraduate Studies Environmental Architectural and Urban Design*, and (3) *Interdepartmental Postgraduate Studies Program, Protection, Conservation and Restoration of Cultural Monuments*. The first one is the result of School professors' long-term effort, perceivable in the discussion of General Staff Assemblies, numerous meetings of the Study Committees, open presentations and discussions with teachers and students, and a two-day conference entitled "Architecture Studies: Continuity and Change". The other two

programs offer specialist knowledge at the postgraduate level. From 1998, the Interdepartmental Postgraduate Studies Program deals with the conservation and restoration of historical buildings, traditional materials, and techniques, digital methodologies for surveying historic buildings, and environmental aspects of heritage structures. On the other hand, the Postgraduate program of Studies EAAD was only recently introduced (2015-16), reflecting the emersion of environmental studies in a national context and is one of only two programs that deal with environmental urban and architectural design in Greece.

A thorough examination of the aforementioned programs was also carried out through detailed analysis of specific courses contained within the respective curricula (1) *Design Studio 7 - Architectural Design In Historical Context*, (2) *Architectural Design Studio II*, (3) *Urban Design Studio I & II* and (4) *Interdisciplinary Studio Course*. In the context of this review, the above selection reflects the ethos of architectural educational practices that prevail at the school, whereby specialized knowledge is introduced through theoretical courses and seminars, is supported through technical teaching and practice, and is ultimately consolidated through interdisciplinary design studios. These do not only focus on a singular approach to the design project's evolution but integrate theoretical approaches, supported by lectures (tutors) and presentations/submissions of small thesis/studies (students), practical exercises, software tutorials, etc.

The review of educational practices is followed by four case studies of realized projects that reflect the issues, practices, and open questions that prevail in the discussion of sustainability and cultural heritage at the local level. All case studies focus on the historic urban context and reflect multifaceted approaches in designing for sustainability, conservation, reuse, resilience. The studies are representative of different scales of intervention: (1) *Bioclimatic upgrade of the greater area of Hrimatistiriou Square* at the historical Centre of Thessaloniki, (2) *Creative reuse of the*

barracks at the Pavlos Melas Metropolitan Park (former military camp), Municipality of Pavlos Melas, Thessaloniki, (3) *Restoration and environmental upgrade of Vernacular Residence at Ano Poli* (Upper/Old city) of Thessaloniki, and (4) *Restoration and creative reuse of a building block consisting of 13+ historic structures, in Plaka, Athens, to house the State Museum of Modern Greek Culture*.

The above case studies are followed by a report on the National legal and regulatory framework under which the projects were developed, which makes further references to the practical context, the initiatives, and national and international programs that instigate and support such initiatives, programs, designs, and applications.

THE UNIVERSITY OF SEVILLE



In this Review, the University of Seville (USE) focused its pedagogical and educational models at the School of Architecture, University of Seville, while the framework of best practices in Sustainability and Built heritage is regarded in the scope of Andalusia. The decentralized character of Spanish geopolitics and the transference of power to the different autonomous governments in terms of heritage management and architectural and urban policies, in general, make one autonomous region the proper framework for this study. Starting from the historical relevance of heritage in Andalusia, established interlink between the architects involved in the professional practice to teach at the university, intensive research on the field, and strong collaboration with public institutions, USE has presented the endeavor to translate this context into education. It has been done through an integral presence of heritage training in the School of Architecture curricula, especially within programs *Fundamentos de Arquitectura*, *The Máster Universitario en Arquitectura y Patrimonio Histórico (MARPH)* /Master's degree in Architecture and Historical Heritage, and *The Máster Universitario en*

Ciudad y Arquitectura Sostenibles (MCAS) / Master degree in Sustainable Architecture and Cities.

For the purpose of the selection of case studies of best practices, the following has been taken into account: (1) focus both on contents and on innovative methods, (2) focus both monographic and those cases where heritage and sustainability appear as a transversal, although essential vector, (3) both compulsory and optional courses, (4) show courses of the last three semesters of the main program on architecture, the semester 8 focused on heritage being 9 and 10 the specialization semesters of the degree.

Accordingly, four case studies were selected (1) *Landscape, City and Architecture in Andalusia*, (2) *Architectural History, Theory and Composition 3*, (3) *Architectural History, Theory and Composition 4: City*, and (4) *Architecture and Heritage*. In this sense, USE highlights that courses in the postgraduate programs are traditionally structured in a set of lectures and/or workshops offered by different professors. This is why innovative methods and coherent curricula is best shown within these last three semesters of the degree on architecture.

In the field of practice, specially built projects, USE applied specific criteria for case studies selection: territorial balance; notions of scales and ownership; diverse aspects and contributions from the professional practice in the context of built heritage and sustainability; awards and acknowledgments while focusing on the less recognized heritage both for institutions and society; temporality, focusing on case studies of the 21st century, as representative of the mature phase of Andalusian practice.

Accordingly, USE presented the case studies of (1) *Rehabilitation of Casa Diáñez (Diáñez House) as administrative building*, Alcalá de los Gazules historic center, Cádiz; (2) *Recovery of King's Path*, Gaitanes Gorge, Service Road of the hydroelectric dam of The Gaitanejo, Paraje Natural Desfiladero Natural de los Gaitanes (Álora, Antequera, Ardales), Málaga; (3) *Recovery of the Cerro*

de San Miguel and the Darro river area. Rehabilitation of the Nasrid wall of San Miguel Alto and its surroundings, Upper Albayzin, Granada, and (4) *Rehabilitation of Santa Ana Ceramic Factory as the Public Museum of Ceramics*, Triana historic neighborhood, Sevilla.

USE completed the diagnosis with a report on urban policies that regulate heritage protection, conservation, and management, offering an insight into Andalusian policies in the Spanish context. USE specifically highlights the regulative framework on all three levels: national, regional, and municipal, while providing an in-depth review of the international context, charters, and recommendations.

Built Architectural & Urban Projects



Serbia (Belgrade)



Italy (Venice)



Cyprus (Nicosia)



Greece (Thessaloniki)



Spain (Seville)



SERBIA

×

Milica Milojević
Mladen Pešić

project

02

Senjski Rudnik - Town of Miners

Regional Centre of Industrial Heritage - Museum of Coal Mining

IDENTIFICATION

Information about the location

✕ Mountain

Address

✕ Senjski rudnik bb,
35234 Senjski rudnik

Country/Region

✕ Serbia / Despotovac Municipality

Coordinates

(GIS: ETRS89/Google Maps: WGS84)

✕ Long= 21.57081287 °
Lat= 43.99437657 °

City size

✕ 18.76 km²

Website

✕ <http://muzejuglarstva.rs/>

Accessibility

✕ Public site

Public visits

✕ Yes

Category

- ✕ Architectural project
 - Reuse (Adaptive)
 - Restoration / Reconstruction
- ✕ Urban Project
 - Urban revitalization
- ✕ Environmental planning
- ✕ Cultural planning

Deliberative and participatory planning

✕ Yes

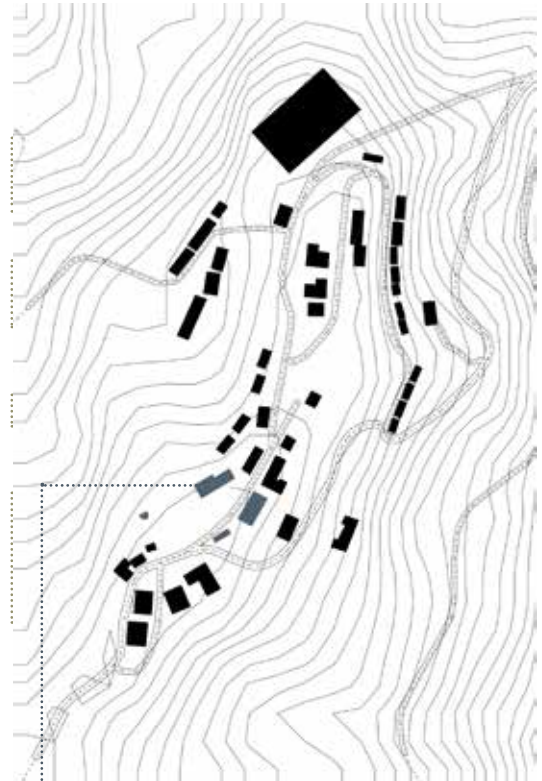


Figure 1. Location map
Authors of the case study report



Figure 2. Senjski rudnik, under construction
source Aleksandra Đorđević

Current use

- ✗ Museum of Coal Mining and Centre of Industrial Heritage

Year (period) of the project renovation/restoration

- ✗ 2014

Area of the building (m²)

- ✗ size of the buildings: 830 m² + 560 m² + 30 m²
size of the site 6.500 m²
area 1990 m²

Current owner

- ✗ public: State property
- ✗ private: some individual buildings though, are privately owned

Architects

- ✗ Mihailo Timotijevic (1949 Serbia); Miroslava Petrovic-Balubdzic (1956 Serbia)

Other designers/engineers

- ✗ Building technology: Nenad Sekularac
Coordination: Nastas Andric
Collaborator (external): Silvia Cravero
Collaborators: Dejan Mitov, Marina Popović, Marija Kočović

Other agents

- ✗ Institute for the Protection of Cultural Monuments, Kragujevac; Institute for the Protection of Cultural Monuments; Museum of Science and Technology; Municipality of Despotovac; the University of Belgrade – Faculty of Architecture; Coal Mining Museum, Senjski Rudnik;

Developer

- ✗ The reconstruction process was executed within the participation of the Republic of Serbia in the “Ljubljana Process II – Rehabilitation of Common Heritage” (“Regional Program for Cultural and Natural Heritage of

South-East Europe, Council of Europe”)

Building contractor

- ✗ Delegation of the European Union to the Republic of Serbia and Ministry of Culture, Republic of Serbia

Cost of the project / execution time

- ✗ No available data

KEY FEATURES



Remarkable attributes / Singularities / Specific Values

The mine of Senjski Rudnik is located in the Resava-Morava brown coal basin. The area is characterized by a combination of coal production with the historic mining artifacts, machinery, and infrastructure, buildings and facilities for site management and workers’ housing within the exceptional natural landscape.

Scope of application / necessity of the project:

The mine complex with the management buildings and mining infrastructure is part of an urban ensemble that also includes residential houses, a school, cultural centre, church, museum and a hospital. Keeping in mind a holistic approach to site conservation and regeneration and the exceptional values of the site as a cultural and natural landscape, a group of twenty buildings and structures of particular interest has been identified and mapped within the site analysis conducted for present and future site action and planning. The entire site should be preserved and develop as an urban complex along with surrounding cultural and natural environment.

Previous studies (Ex. Archaeological, historical, structural, materials, etc.)

- ✕ - A conceptual project of the Rehabilitation of the urban area and restoration of buildings of historical importance, 1973. documentation in IPM Kragujevac. (Partly realized).
- The main (executive) Project of the Museum, workshop, and Alexander's Shaft.
- There were previous projects for i. e. the Workshop restoration, near Alexander's Shaft dating from the seventies and the eighties, which, due to political unrest and shortage of funds, have never been executed.

HISTORY OF THE BUILDING/SITE



Original use

- ✕ Industrial

HISTORIC USES

Senjski Rudnik is the oldest mining complex in Serbia, established between 1853 and 1860, during the rule of Prince Aleksandar Karadjordjević. It is located 150 km south-east of Belgrade, in the natural landscape of a low-populated area, significant for its natural beauty and medieval cultural heritage. Senjski rudnik represents a town of miners, located in eastern Serbia, all industrial settlements' attributes. The exploitation of coal started in 1853, and today, until recently, it was still active, although in a significantly decreased capacity. This area is Serbia's oldest coal mine and colliery, complete with shafts, administration buildings, storages, and workshops. The mine is surrounded by an old, well-preserved village community, typical for 19th – 20th-century industrial communities. Some typical stages of

urban development and technological changes are clearly evident.

CONSTRUCTION PERIOD

First construction activities within the complex started after 1853, after the mine was opened. The urban matrix indicates a rich social life, technological transformations and economic challenges. A habitat has been developed around two historically important points: Alexander's Shaft (1853 the first shaft in the history of coal mining in Serbia), and the Main Shaft (1927), the latter equipped with an excellently preserved head gear and a steam engine from the 19th century (still in function). Within this study two buildings will be examined in detail having in mind that there are the only ones reconstructed in previous decades and years: Museum of coal Mining (1930) and Mechanical workshop (1922).

SUMMARY OF MAJOR FUNCTIONAL AND STRUCTURAL CHANGES / YEAR OF INTERVENTION

Situated in a picturesque and -preserved natural environment, shaping a cultural landscape unique in Serbia, despite a deep economic decline, this is a strong symbol and centre of regional identity, and furthermore, of the identity of miners and workers elsewhere in Serbia. The place is available for various branches of tourism, mainly cultural. Surrounded by other mining areas (Ravna Reka, Resavica, Sisevac), also interesting but evidently of smaller historical significance. It could be a regional heritage and tourist centre, a place of economic regeneration and a powerful element of social cohesion. It is planned to develop the site as Regional Centre of Industrial Heritage and Ecomuseum.

ARCHITECTS / AGENTS

Anonym

PHYSICAL CONDITION BEFORE RESTORATION / RENOVATION

Considered as an area, it is in a bad state. Most of the buildings are in a condition from very bad to bad. The surrounding landscape is in a rather good condition at the moment but it is threatened by a landslide. Mine buildings and machinery, as well as the town as a whole show many signs of neglect and decline.

STATUS OF PROTECTION

The legal protection is limited only to the oldest shaft, Alexander's Shaft, Workshop and Museum in neighbouring area, and dates from 1975. They are protected as individual monuments. Under the Protection of the Republic of Serbia as a "property of great importance", 1979. (monitoring of the RIPM of Serbia). The recent candidacy of this area for the UNESCO list of industrial heritage and the entrance to the European mining roads map will undoubtedly strengthen the local community's economic base and development potential.

GENERAL DESCRIPTION OF THE BUILDING BEFORE ITS RENOVATION / RESTORATION

Museum of coal Mining
Main building; built in 1930, today it hosts the central exhibition which on two levels presents mining history in the region, from the 3rd century until today

Mechanical workshop
Engineering workshop; it consists of four rooms, displaying the everyday life of the miners and their families; documents show that women worked as miners even decades before World War I, but especially during the war when men were drafted.

PROJECT DESCRIPTION



DESIGN PROJECT IDEA FOR THE RENOVATION / RESTORATION

Design and reuse of the building complex into a specific open-museum site, aims to establish a lasting image of this authentic space of the oldest industrial complex in Serbia.

Intervention on the ground floor revives the images of production processes that ensured the coal distribution: industrial rails, station and wagons. Existing buildings will be reconstructed to have an authentic initial appearance, while ruined parts of the complex are being complemented by contemporary interpreting their initial forms and using materials such as glass and steel.

Interior design brings back the working space authentic ambien with carefully selected objects that illustrate the atmosphere of everyday life in the mine. Reconstruction and reuse demanded interventions on two levels:

1. Bringing back authentic heritage elements in form and materialization
2. Interpretation of the heritage through introduction elements of contemporary design to support new museum aspect, applying archaeologically neutral materials.



Figure 3. The coal museum

Autor: DjordjeMarkovic - Sopstveno delo, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=57429692>

DESCRIPTION OF THE CHANGES AND ADDITIONS

Restoration works include, inter alia: new floors, new thermal insulations, reparation of doors, windows, roofs, painting of internal and external walls, new heating, water and sewerage system, construction of a new aluminium-glass construction entrance hall of 76 m² for the Workshop building and new addition to the Museum building of 160 m², new electricity and IT systems. Infrastructural works will include a new pipeline for water supply with fire fighting protection and a new heating pipeline connected to the existing boiler room.



Figure 4. The model of Senjski rudnik
Autor: DjordjeMarkovic - Sopstveno delo, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=57429714>

BUILDING MATERIALS

The reconstruction design project aims for the harmonious coexistence between the existing and the new. Authenticity, as a fundamental value in design, is achieved by using materials that are already present on site. Interventions preserve the identity of place primarily through the form and function including a landscape as an inseparable part of an entity. Annex of the future museum was built on a concrete structure with a facade coated in 5mm thick corrugated steel. The choice of the façade material resulted from the idea to emphasize the contrast of the newly reconstructed parts. The area around the building was enhanced with the carefully positioned artifacts - pieces of the former mine equipment.

PROJECT IN RELATION TO THE SUSTAINABILITY

Social aspect:

In order to find the most optimal development strategy – shutting down the mine, while mitigating the social risk of increased unemployment - the Government of Serbia and EU Delegation conceptualized reconstruction of the mine complex in order to preserve it as industrial heritage and engage the former miners in its new activities.

Economic aspect:

Ending the coal mine operation will create conditions that allow tourists to visit selected parts of the coal mine underground and use the elevator which daily transports the miners. These features will gradually widen the tourist offer, serviced by the former miners and their entrepreneurial successor. The recent candidacy of this area for the UNESCO list of industrial heritage and the entrance to the European mining roads map, will undoubtedly strengthen the economic base and the development potential of the local community.

Environmental aspect:

Important information regarding sustainability is the process of the institutional organization during the revitalization and reconstruction process within natural environments and soil regeneration.



Figure 5. The coal museum
Autor: DjordjeMarkovic - Sopstveno delo, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=57429726>

SPECIAL METHODS OR TECHNIQUES USED IN THE PROJECT WHICH REFLECT THE SUSTAINABLE DESIGN

The idea was to use local materials and materials that are resembling the mining industry in general.



Figure 6. Mechanical workshop / Workshop space
Source: Aleksandra Đorđević

DIGITAL DATA EMPLOYED FOR THE DOCUMENTATION (3D SCANNING, PHOTOGRAMMETRY, ETC.)

✗ No data

TOOLS/TECHNOLOGIES USED FOR THE IMPLEMENTATION OF THE NEW USE

✗ No data

DISSEMINATION / PROMOTION ACTIVITIES (WORKSHOPS, CONGRESS, PUBLICATIONS, PRIZES)

The project was nominated in 2015 as a national representative for Mies van der Rohe Award.

- <https://www.erih.net/i-want-to-go-there/site/senje-coal-mine>

- <https://miesarch.com/work/571>

- <http://www.rudnicikulture.com/en/category/mines/senje-mine/>

- <https://www.archdaily.com/tag/senjiski-rudnik>

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- Keča Lj., Bogojević M., Marčeta M. (2011): Trend of the total purchasing volume of Non-Timber Forest products in the area of the municipality of Ivanjica. Forestry, Journal of Forestry processing wood, the horticulture and landscape architecture and environmental engineering and protection of land and water resources 3-4 (87- 97).

OTHER SIMILAR PROJECTS AS A REFERENCE

Labin Mine / Istrian coalmines Raša - Labin

Underground City XXI Labin is a project of protection for the ex-coal mine in Labin and Raša (region of Istria, Republic of Croatia), its industrial and architectural heritage, part of which has been already recognized as a national cultural monument, by the construction of a real futuristic underground town, with streets, bars, galleries, swimming pool, shops, restaurants, children playgrounds, Museum of Coal Mining, as well as all other contents any modern town must have, including own Government,

Statute, Mayor, police, laws and regulations, etc., relying on the historical pattern of the Republic of Labin, in 1921. The leading idea of the project was to provide ample and true testimony of the almost 400 years old tradition of mining, transforming historical patterns and industrial heritage into an avant-garde art project with a strong economic and social impact (national/regional cultural and tourist attraction, generator of future local development), by the construction of the first underground town in the world.

More information available at:

<https://platforma981.hr/2019/08/28/novi-svjetionici-hrvatskog-jadrana-labin-podzemni-grad/>

REFERENCE TO WORLDWIDE EXAMPLES

Zollverein Coal Mine Industrial Complex, Germany

The Zollverein Coal Mine Industrial Complex (German Zeche Zollverein) is a large former industrial site in the city of Essen, North Rhine-Westphalia, Germany. It has been inscribed into the UNESCO list of World Heritage Sites since December 14, 2001, and is one of the anchor points of the European Route of Industrial Heritage. The Zollverein industrial complex in Land Nordrhein-Westfalen consists of a historical coal-mining site's complete infrastructure, with some 20th-century buildings of outstanding architectural merit. It constitutes remarkable material evidence of the evolution and decline of an essential industry over the past 150 years.

More information available at:

<https://whc.unesco.org/en/list/975/gallery/>