Landscape-based design as an instrument for sustainable development in heritage conservation

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Abstract: The project for restoring and valorizing the "Jumelţ" iron furnace historical monument dating from the 19th century and located in Zimbru village, Arad County, has been substantiated by a series of analyses and specialized investigations. The landscape study, based on a hybrid methodology, has led to a specific set of knowledge of the local physical and social conditions and to the highlighting of the relations between the heritage object and its proximity. In conclusion, the knowledge generated by the landscape research has directly influenced the design process, has indicated the legitimacy of reconnecting the heritage monument to its context, as a non-speculative design approach, and has also facilitated the integration of sustainable development measures.

1. Introduction

Exploiting historical monuments is currently on an upward trend in Romania, but in practice it is limited predominantly to architectural objects and scenarios (such as rendering a historical visual image of a place) and has less to do with the landscape and local communities per se. The conservation and restoration process is focused on protecting the heritage monument, and the valorization programmes indicate a preoccupation with the material culture and especially with prestigious monuments (e.g. archaeological sites, medieval fortresses, etc.), as well as a usage of general knowledge. This approach enhances the loss of authenticity and increases the risk of generating speculative scenarios (pseudohistory, idealization of the past, or utopias), eventually leading to a reverse narration starting from (speculative) fiction and ending with a certain "reality" of the object (e.g. historical/pastiche architecture).

The protection of the monument has been achieved by establishing protection areas [1], but in practice the tendency is more to control proximity and less to use

the vicinity for heritage knowledge and valorization. Nevertheless, it is relevant in the case of the monument to relate on a landscape level, and the participation of the landscape in the formation of local cultures is a commonly accepted fact [2]. Thus, a different perspective on the value of the heritage, as well as on the knowledge process, opens up.

Landscape research involves a complex knowledge process and may be conducted by producing research results, but also by discovering manners in which to transform research knowledge into something useful and practical such as "planning and design guidelines". For example, site-specific features in the professional practice of landscape programmes have sometimes been contrasted to knowledge that can be generalized, and this should not be the case [3]. Design programmes require both general (or scientific) and local (or situational) knowledge, as well as combining or integrating these two types of knowledge [4].

Our study proposes landscape research as a method of acquiring knowledge, in order to reintegrate the monument on a landscape level and to include sustainable development as a solution for the integrated conservation of the heritage.

2. Materials and methods

In the debate concerning the methods of acquiring knowledge of the landscape applied as part of the programmes for protecting and valorizing the heritage, we have chosen classified historical monuments. Of all the heritage categories, research is limited to technical and industrial cultural sights, which have been and still are largely co-dependent on the nature of the neighbouring landscape (particular conditions, resources, accessibility, etc.).

The landscape of preindustrial and industrial monuments (and not only) preserves the essential components of the manufacturing process [5], but also social structures, which makes landscape research more important.

The technical heritage in Romania is largely at risk of disappearing and being devalued [6], as well as at risk of its protection focusing solely on the object and on valorization through speculative scenarios (e.g. utopias or pastiches), this being one of the reasons for the narrow focus of the study. We would like hereby to mention that we have identified this tendency in other categories of monuments as well (e.g. archaeology).

In Romania, technical and industrial monuments were entered under heritage protection quite late (during the 50s), without being allotted a specific category and instead being cumulated with the architectural (bridges, mills, etc.) and the historical ones (foundries, the ruins of the furnace in Moneasa, Arad County). As per the *List of Historical Monuments* of 1992, absorbed by later versions as well, only 2.99% of them are monuments with technical value or associated with industry [7]. The current situation is difficult to estimate in the absence of an

inventory anchored in on-site research, the technical inheritance being in fact much more generous than mentioned. The lack of representation of this type of heritage in the *List of Historical Monuments* is due to the prioritization of great or "classical" cultural monuments, but also to the scant interest and bibliography, correlated with the lack of specific legislation.

The site selected for this study is the "Jumelţ" iron furnace located in Zimbru village, Arad County, a historical monument dating back to the 19th century and classified under the code LMI AR-II-m-B-00661 [8]. After selecting the research material, we analysed the landscape located in the monument's proximity.

2.1. Methodology

The research based on landscape knowledge has generated a hybrid methodology and has a vast multidisciplinary coverage, from evolutional territorial analyses based on data from natural, social, and human sciences and arts, to site survey. The various types of knowledge accessed both by the team of landscape architects and by the project collaborators have been managed during the analysis of the landscape on two levels: the macro level of the territory and that of the historical monument site, both being later on integrated into the design process focused on heritage protection and valorization.

2.1.1. The territorial level

– *The evolutional analysis of the territory* has revealed the points of reference in terms of macro-identity of the local landscape correlated with the historical regions, but also the multifaceted identities delineated by narrower frames belonging to various disciplines (history, geography, ethnology, etc.). Thus, the landscape analysed is part of the historical region of Crişana, the cultural subarea associated with the Crişul Alb River, delineated by the eastern side of Zărandului Hollow and by Codru Moma Mountains.

– *The geographical research has determined the identification of the type of natural landscape* and was based predominantly on geological, hydrological, and forestry data. In addition to the geographical description of the place, we have also identified the resources directly involved in iron exploitation and processing (the useful mineral resource – the iron deposit, the motory resource – the local hydrographical network, the combustion/burning resource – the wood charcoal and the human resource – specialized and non-specialized multiethnic communities) (see *Figure 1*).

– *The analysis of the administrative policies in the context of preindustrial ferrous metallurgy in the region (heritage specificity)* has facilitated the reconstruction of a history researched in a fragmented manner, focusing on specific fields (ferrous

metallurgy, science history, local monographies, etc.). The methods of analysis included researching the metallurgical policy enforced by the Austro-Hungarian Empire in the Partium and Transylvania regions (including e.g. colonizations), historical urbanism research (military maps) and local history (monographies, seals and postcards), as well as the history of noble families. The usage of the analysis lies within the identification of the legibility of the preindustrial patrimonial resource preserved in the heritage objects, meaning the ruins of the furnaces used to melt ores, and is anchored in the (in)visibility of the landscape of the studied area (Moneasa–Dezna/Răschirata–Zimbru) (see *Figure 2*).
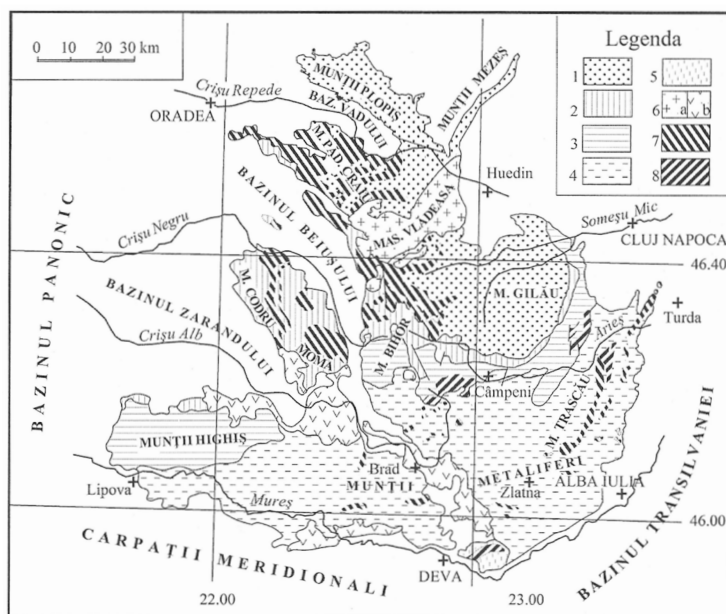
Source: Orăşanu, 2020

Figure 1. Structural map of Apuseni Mountains

– *The science history analysis* has facilitated the familiarization with the technical and chemical processes involved in the iron metallurgy, which was useful for understanding the constructive evolution of the furnaces, as well as their impact on the microlandscape in their proximity.

– *The compared analysis* between similar objects from the researched area (Moneasa, Dezna/Răschirata, Zimbru) and the historical evolution of the plots of land and that of the microlandscape has led to identifying the resources involved in the technological process and the relations between the objects of the furnace.
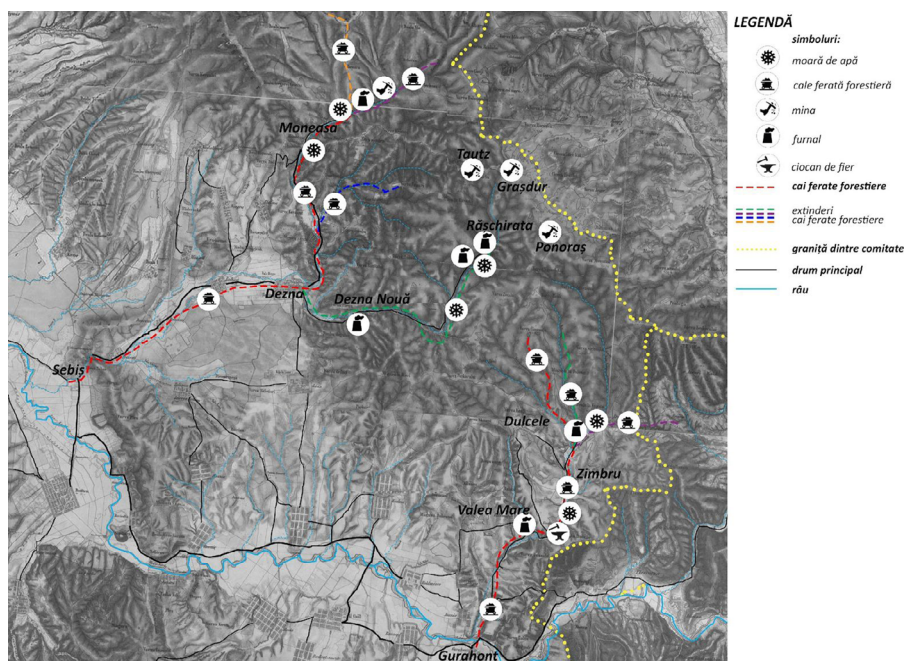
Figure 2. Map of the ferrous metallurgy in the cultural landscape
(Moneasa, Dezna/Răşchirata, Zimbru), based on The First and Second Military
Survey of the Habsburg Empire

2.1.2. On a parcel level

– *The analysis of the existent situation of the parcel* has been correlated with the specialized investigations conducted by our collaborators and together have determined the identification of the current site conditions and components (topography, geology, archaeology, hydrography, etc.). The detailed land measurements have indicated the microtopography of the historical monument site, together with the new technology surface investigations.

– *The non-invasive investigations used to acquire knowledge about the terrain* (digital surface models – D. S. M., digital elevation models – D. E. M.) have contributed to obtaining the microtopographic details of the site (altitude, elevation of existent elements, vegetation coverage of the surfaces, etc.) (see *Figure 3a*).

– *The magnetometric measurements* have contributed to prospecting the potential archaeological resource existent on the site (see *Figure 3b*).

– *The preventive archaeological investigations* aimed to identify *in situ* the potential building remains of the technological complex from Zimbru, illustrated on historical military maps and identified through magnetometric investigations (see *Figure 4*).
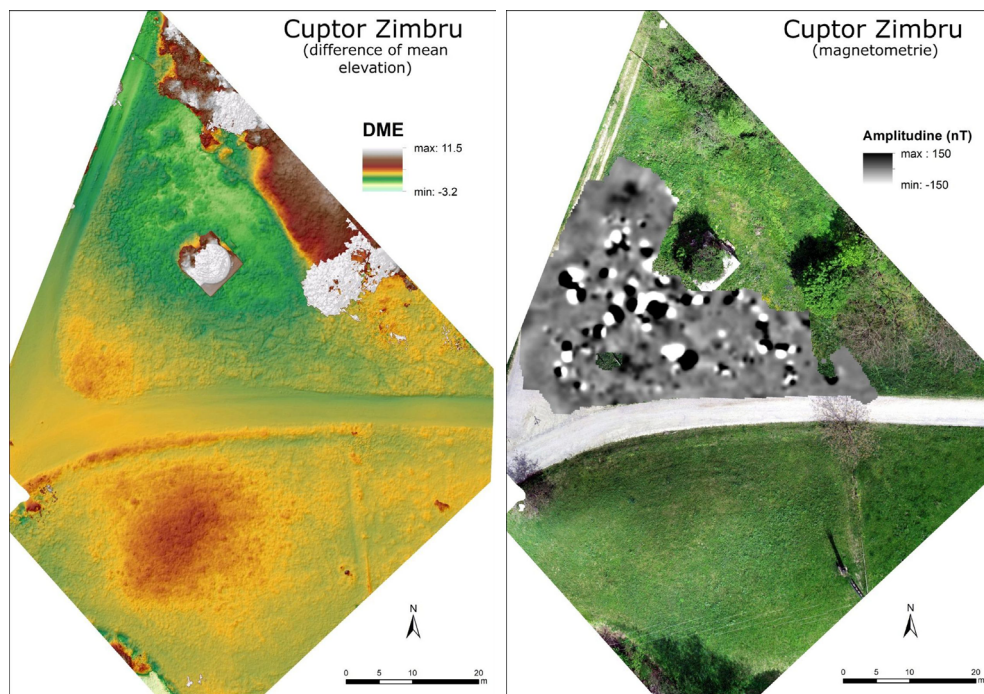
Figure 3. 3a. Difference of mean elevation/DME; 3b. Magnetometric
measurement

Figure 4. Archaeological sections

    – *The physical and chemical expertise of the type of materials used to build the masonry of the monument* was conducted through a series of microscopic, XRF spectroscopic, petrographic, and chemical analyses. The composition of the furnace components indicated the type of materials used (quarry stone, ferruginous limestone, carbonaceous limestone, burnt bricks, mortars based on loam sand and mortars made of sand and lime, slag), information useful for identifying the local resources, practices, and construction models (part of the diffused knowledge).

    – *The chemical analyses conducted on the slag sample taken from the proximity of the furnace* indicated a mineral resource rich in iron between 80% and 81% and manganese between 20% and 25%, which confirms the proximal provenance of the ferrous deposit, the Vaşcău Plateau (the Codru-Moma Mountains), as per the geological data.

    – *The ethnological survey* provided information (qualitative data) on the history of preindustrial metallurgy in the area and descriptions of the *Jumelț* iron furnace in Zimbru, as well as local practices, customs and legends, nature management and tourism, obtained through various specific methods: semi-guided interviews, discourse analysis and participatory observation, etc. (see *Figure 5*).


Source: authors' photo, 2022

Figure 5. Ethnological survey expeditions, the Vaşcău Plateau

3. Results and discussions

The multidisciplinary landscape research has generated different complementary types of knowledge. The proximal landscape becomes a (re)source of specialized and local knowledge, especially in the case of historical monuments that have lost their historical function. From the analysis of the topics debated within the landscape study, we can synthetise four directions relevant for the design programme that aims to valorize the monument.

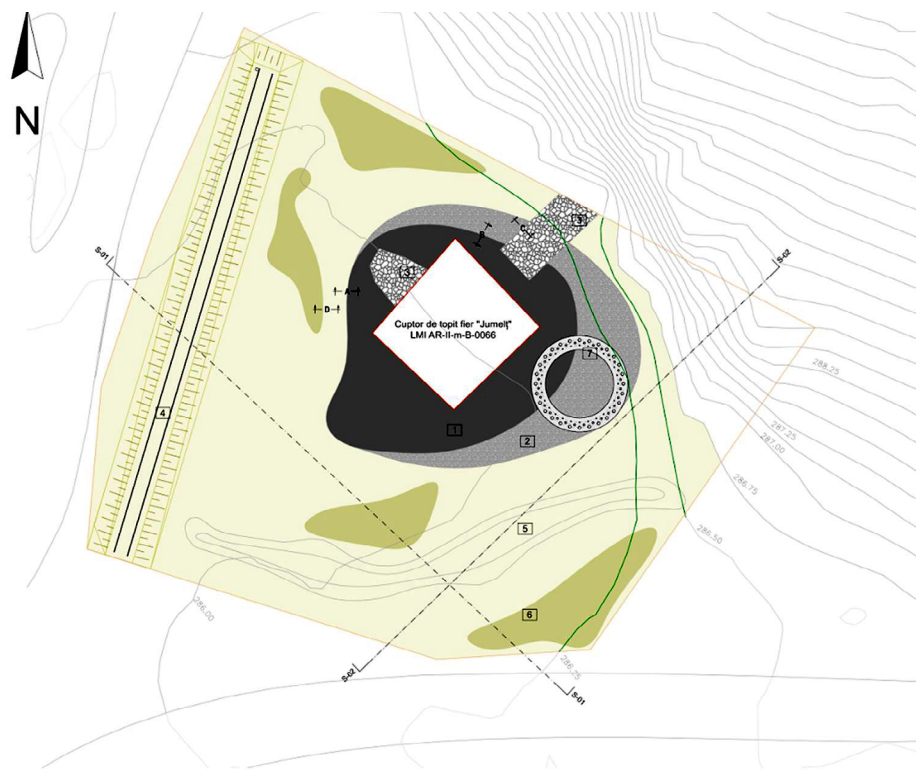### 3.1. (Re)connecting the heritage object with the landscape
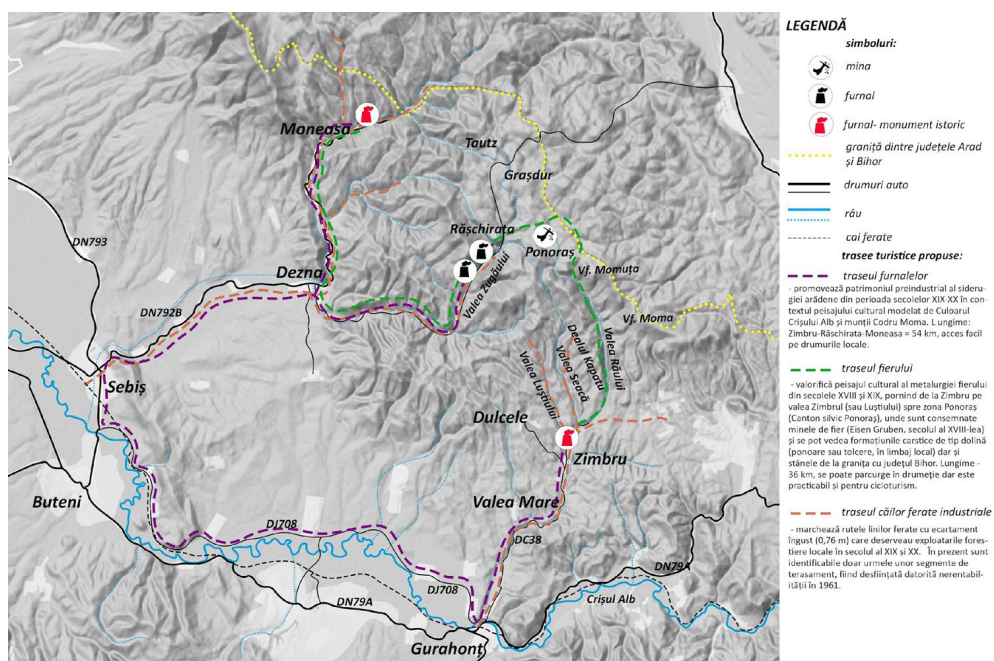
Source: authors' compilation

Figure 6. Map with suggested thematic touristic routes

Lining up the object with its proximity again was achieved through an exercise of territorial memory recovery (memory residing in a diffused knowledge, minimally researched by science, and in the overlapping of historical events with local legends) on the one hand and by means of a horizontal connection with the landscape on the other. Suggesting thematic routes correlated with the technological routes of local preindustrial metallurgy, with natural and historical resources, becomes a sustainable way of heritage and touristic (economic) valorization of the area

(*Figure 6*). Reconnection with the landscape, understood as a passing from the protected object to the subject (approach generated by value) is an integrated conservation method that, by incorporating the local and nature in the heritage experience, becomes a generating factor in the social and economic development of proximal communities. At the same time, connecting the historical monument with the local landscape becomes a catalyst in the promotion of the common asset (both the heritage and the landscape).

3.2. Negotiating identity layers

Notes: 1), 2), 3) trafficable areas with a draining role; 4) narrow railway bed (reinterpreted); 5) water gutter (reinterpreted); 6) meadow area (flower assortment); 7) steel art installation, an interpretation of wood charcoal production.

Figure 7. Landscape plan proposal

The research conducted on the site level has revealed various cultural layers overlapping on the monument site. In addition to clarifying the composition of

the 19th-century technical complex (the furnace for reducing the iron ore, annexes, mounds for loading the materials, water gutter, traffic routes to the exterior, etc.), we have also identified elements dating from after the preindustrial metallurgical period and a narrow forest railway used for sylvan exploitation in the area. As shown in the historical analysis, these forest tracks were part of the local industrial landscape (Sebiş–Moneasa, Moneasa–Dezna–Răşchirata, Gurahonţ–Zimbru), even if in the present day only fragments of the railway bed are still visible. The design programme proposed a vertical connection of the identity layers of the site and a horizontal connection to the landscape (the Codru Moma Mountains forest railway line). Reinterpreting the forest railway on-site (identified in *The Third Military Survey from 1869–1896*) by employing a multifunctional landscape element (limit with the forest road, rest area, signs, and cycloparking) also becomes a way to recover the memory connected to the local forest industry (*Figure 7*).

3.3. Integration in the local ecology

Following the complex landscape analysis, the design programme included a nature-based solution for the valorization of the heritage, but also for the protection and sustainable management of the modified ecosystems (preindustrial site). Part of the solutions were derived from discussions with the locals, in which they described the landscape and the agricultural practices (the ethnographic survey method).

Reinterpreting certain elements of the preindustrial technical complex (water-course) or other identity layers (the railway bed of the forest railway) has included solutions for a sustainable management of meteoric water (collection and deep infiltration). Another objective of the sustainable design programme was to ensure the draining of the water surrounding the historical monument by employing environment-friendly solutions (dry surfaces made of mineral aggregates that ensure the drainage of the water) and building a drain on the sides located near the high area of the site.

The vegetation works aimed to preserve the meadow habitat existent on the site and proposed interventions meant to facilitate biodiversity (useful assortments of flowers, plantations of irises/*Iris pseudacorus*). The proposals to eliminate the potentially invasive species (*Fallopia sp.*) identified on the site have targeted sustainable methods of intervention (repetitive cuts before fructification in order to exhaust the invasive plant) that are meant to support the health of the ecosystems and the management of biodiversity. The nature-based design solution includes an important educational component, associated with patrimonial protection and valorization.

3.4. Landscape curation

Landscape curation is a concept introduced by the authors in the landscape architecture design programmes and refers to the landscape interpretation of various topics; in this case, of the technical and industrial heritage.

The understanding and legibility of the heritage technical complex is an important objective in valorizing and supporting the educational role of the heritage. In addition to the idea of rendering the missing components of the technical process in a figurative language, we opted in favour of the author resorting to a landscape interpretation and to an artistic representation of certain elements. Due to a multidisciplinary collaboration, we proposed an immersive work that renders in a sculptural language one of the components of the technological process used to melt iron, wood charcoal (*Figure 8a*).

Recovering the historical material identified on site (bricks, stone blocks, pieces of cast iron, etc.) and using it in the design solution becomes a gesture of creative approach towards the integrated heritage conservation programme.

In addition, the knowledge generated by the landscape research has been transferred both to the heritage valorization component and to the signage programme, where various objects and materials display complementary information relevant to the local heritage experience (local landscape and thematic routes, the technical process, the family of local entrepreneurs, etc.) (see *Figure 8b*).

Figure 8a. Steel art installation, an interpretation of wood charcoal production
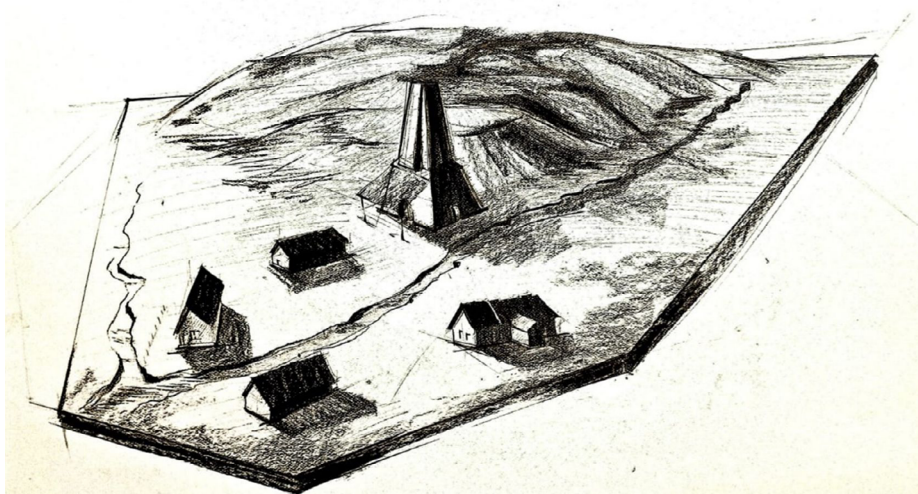(Rom. *bocşerit*) – sculptor Dan Vişovan

Figure 8b. Cast iron model of the historical site to be integrated into the
landscape concept – sculptor Dan Vişovan

4. Conclusions

The multidisciplinary and multi-levelled approach of landscape has revealed
visible, diffused, and invisible connections to the historical monument. On a
territorial level, identifying the geographical specificity and locating the natural
resources used in preindustrial metallurgy and the similar technical monuments
situated in the proximity have facilitated the proposal of thematic visitation
routes for the area, a horizontal (re)connection. On the other hand, identifying
the functional technical complex on a site level (watercourse, constructions,
etc.), but also the vertical connection of the overlapping cultural layers, have
determined conservation and reinterpretation approaches as part of the design
solution. Incorporating landscape research in heritage valorization projects leads
to the conclusion that reconnecting the heritage object with its cultural landscape
highlights complex relations and valences in the proximity area and facilitates
sustainable development measures for the protection of the heritage.

Acknowledgements

References

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