

## ViDiNa - 3D Visualization Digitisation of Natural Monuments

### **A combination of photogrammetry and georadar as an assessment basis in the evaluation of interventions in natural and archaeological monuments**

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### **ViDiNa - 3D Visualization Digitisation of Natural monuments<sup>1</sup>**

Landscape is to be regarded as something temporary and transient. Landscape - lifted out of the environment of philosophical considerations - is to be seen as a product of the environment in which it is embedded and as a product of its civilizational use. Landscape is viewed and shaped by the cultures inhabiting it; it is therefore always to be considered against the background of the respective society. How objectively the investigators proceed is based on their personal history of development. If the environment or anthropogenic influence disappears or changes, the landscape will almost inevitably change consequently. It is thus not only to be addressed as a construct in the mind of the observer, but to an equally decisive extent as a historical asset that can be changed at any time. Therefore, in his need for protection, man must face the discussion which landscape is to be considered worthy of protection, which point in time of a possible restoration of a landscape is to be evaluated as correct. Recent landscape can be understood as subjectively considered since the result of consideration is in each case a result of the culture inhabiting it and is therefore an inadequate basis for a standard for evaluations.

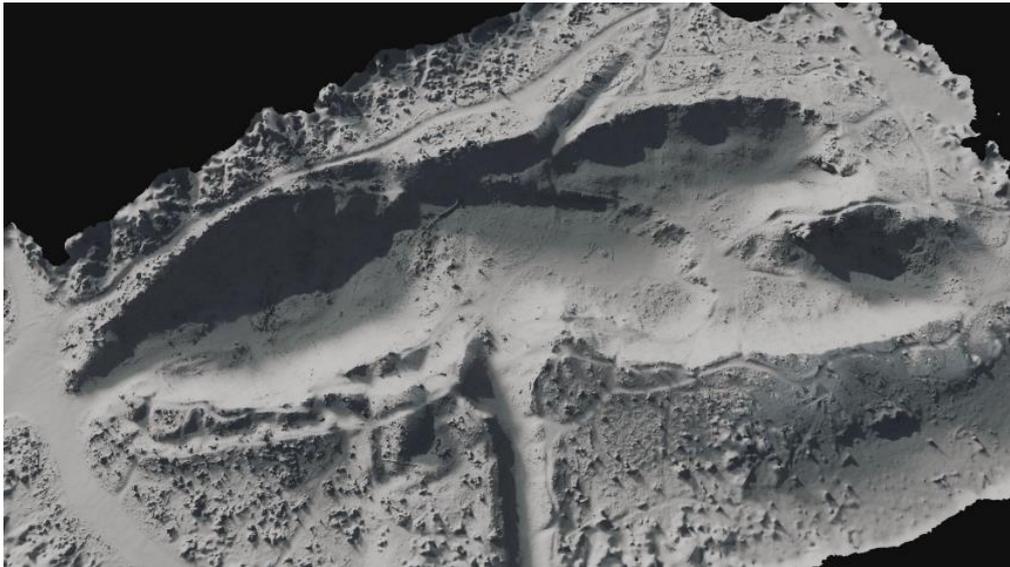
If the creation of cultural space is one of the noble goals of human civilization, then natural space is to be seen as the sum of a series of processes that shape nature over long periods without human intervention and are not purposeful. Cultural space and natural space are perceived subjectively by their observer. Nature is to be seen as a series of processes which - in contrast to culture - take shape without human intervention over longer periods of time and are not goal-oriented. Naturalness of nature can manifest itself as a desirable state. Creation of cultural space is to be regarded as one of the goals of human civilization. Natural monuments are individual natural formations that are worthy of preservation either because of their scientific or cultural significance, because of their uniqueness or rarity, because of the special character they lend to the landscape, or because of their special function for the landscape balance.

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<sup>1</sup> <https://www.wien.gv.at/umweltschutz/naturschutz/gebiet/naturdenkmaeler/index.html>

Owners of natural monuments are not only required to take conservation measures - often in contrast to the property owners' ideas of property utilization - they are also subject to the prohibition of endangerment and impairment.

To manifest natural monuments exemplarily where the human influence was the triggering influence for the emergence of the same, is an essential (re)discovered approach in the assessment. Examples of this are the formation of the landscape of the Neolithic use of the resources of the Maurer-Antonshöhe (Natural monument 441) or the modern fortification activities at Bisamberg<sup>2</sup> (Natural monument 695) in Vienna.



*Fig. 1. Natural Monument Nr. 441, Mauer-Antonshöhe, Wien  
(© City of Vienna Environmental Protection Dept., Crazy Eye)*



*Fig. 2. Natural Monument Nr. 695, Alte Schanzen, Wien (© City of Vienna Environmental Protection Dept., VIAS)*

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<sup>2</sup> <https://skfb.ly/otoJl>

The search for suitable cooperation partners and the creation of a network of interested and competent colleagues is elementary for the success of this project. The use of drones over ground monuments and natural monuments requires permission, agreement and willingness on the part of the land administrators and owners. The necessary equipment consists, among other things, of expensive photo poles like the one at the hollow way at the Johannesberg<sup>3</sup>, tripods or suitable photo cameras. The study of recent and historical aerial photographs creates an understanding of the landscape in which the natural or archaeological monument is embedded. Airborne laser scanning is an important mosaic of landscape archaeology and conservation for recognizing landscape relief and topography. By obtaining enough data, generation of a digital terrain model, 3D visualization and display in Scetchfab is accessible. Repeated, intensive walk-throughs complete the picture obtained. By using QGIS and ensuring sufficient storage space and backup options, results can be visualized and with a lot of patience the awareness of decision makers can be created to get an important tool in the 3D visualization of natural and soil monuments.



Fig. 3. Natural Monument 745, Am Johannesberg, Wien (© City of Vienna Environmental Protection Dept., VIAS)

To apply the 3D visualization (photogrammetry) as an assessment basis for the impact evaluation in monument and nature protection according to plan, new methods and measures for the care and preservation of natural monuments in Vienna are being considered. Visualization and photogrammetric processing should provide experts in nature and monument protect with instructions and approaches to answer the question in the restoration after the original condition.

<sup>3</sup> <https://photos.google.com/share/AF1QipORD6jDJoRFuOVXM3bCrJMtsj7JBimKG82bUHF5G36A--DNqiwNtFz4MOKZwTBQ?key=VjdBdzBHVEZuX3pWLThxN3BkVjRKZ2cxUWR5OGt3>

3D visualization and photogrammetry provide calibrated and measurable data by using laser scanner, camera and radar, a documentation of topographically difficult areas with pictures, plans and maps, a collection of extensive amounts of data in a short time with relatively low costs, a possible data evaluation from coarse to detailed, the representation of smallest objects up to complete landscapes (digital terrain model), an interdisciplinary data exchange and a standardized surveying process.

Archaeology knows many effective factors, which are elements of human and cultural development. Recreation is only one of them in our modern time and is only to be considered as one of many other aspects to be taken into account for an evaluation, e.g., in nature conservation. Therefore, a reconfiguration is needed. Like landscape archaeologists, nature conservationists try to take a simultaneously emic and etic position in the assessment of an intervention, a difficult undertaking that is often doomed to failure due to the lack of objectivity and the appropriate assessment methods.

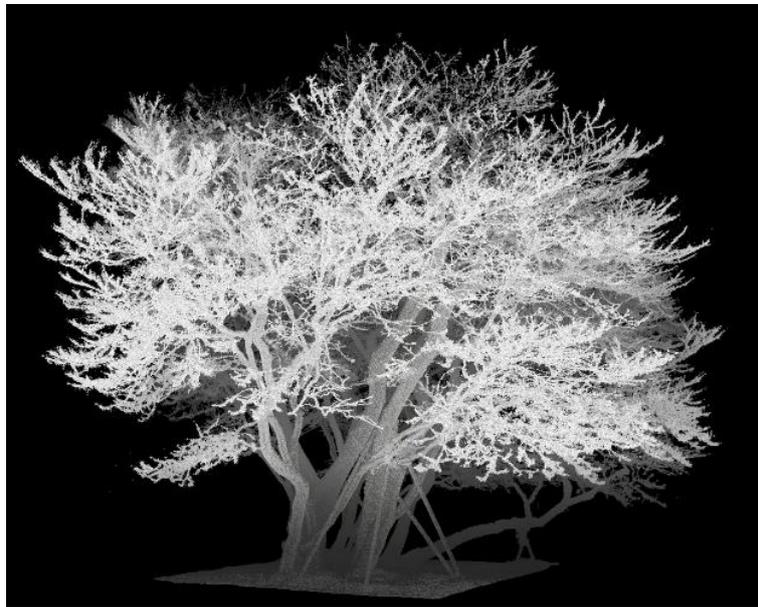


Fig. 4. Natural Monument Nr. 762, Judasbaum (*Cercis siliquastrum*), Wien  
(© City of Vienna Environmental Protection Dept., Crazy Eye)

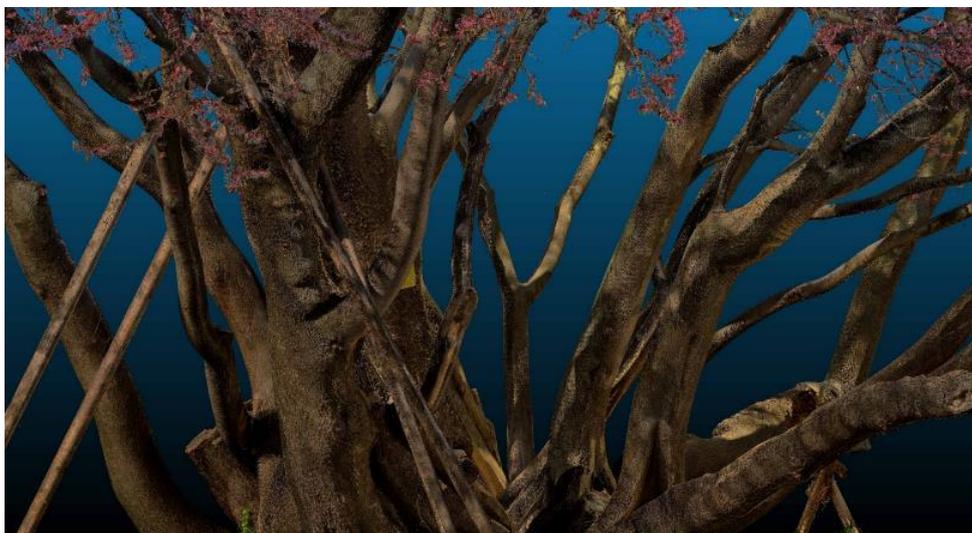


Fig. 5. Natural Monument Nr. 762, Judasbaum  
(*Cercis siliquastrum*), Wien (© City of Vienna Environmental Protection Dept., Crazy Eye)

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none

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