

# The Exploratory Dimension of Drawing in the Representation of Landscapes from Above

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## Abstract

*The aim of this contribution is to demonstrate the exploratory nature of the representation of landscapes from both the more properly expressive and interpretative aspects and the analytical and cognitive one of the environmental contexts. Initially, the paper clarifies the historical and cultural reasons for the link between point of view and landscape, then retracing some historical stages in the alternation between perspective point of view and zenithal point of view in the representation of the landscape.*

*Subsequently, the paper illustrates some research carried out and in progress at the Department of Architecture of the University of Roma Tre concerning methods of acquisition, processing and data management aimed at reading, analyzing and understanding the landscape. The case studies are: representation of the archaeological landscape of the southern sector of Rome; survey and representation of the site where the Mausoleum of Sant'Urbano is located at the IV mile of the via Appia Antica with UAV and laser scanner; survey of the coast of the Pontine-Roman sector.*

*Keywords: landscape representation, viewpoint, documentation, UAV, LiDAR.*

## Introduction

We must define the nature of the correspondence between 'landscape' and 'point of view'. The research deals with the representation of landscapes from above, verifying how Drawing is an act of reading, analyzing and interpreting urban and territorial contexts.

Moving between art and science, the aim of this contribution is to demonstrate the exploratory nature of the representation of landscapes from both the more properly expressive and interpretative aspects and the analytical and cognitive one of the environmental contexts. Starting from outlining different ways of approaching the theme that links landscape and point of view according to theoretical, historical and artistic connotations, the contribution describes some research carried out and in progress in the

Architecture Department of the University of Roma Tre. The research concern methods of acquisition, processing and management of data aimed at understanding the contemporary landscape.

The concept of landscape is polysemous and has taken on multiple semantic meanings over time. The current meaning of landscape was defined during a cultural process that materialized from the 1980s [1] until the beginning of the 2000s, and it is expressed in legislative documents that make the concept explicit. Among these, the *European Landscape Convention* (2000) [2], the *Carta di Napoli* (1999) [3], the *Prima conferenza nazionale sul paesaggio* (1999) [4], which state that the concept of landscape is mainly based on two aspects, namely the perception and



Fig. 1. Leonardo da Vinci, Paesaggio sul fiume, 1473: <[https://it.wikipedia.org/wiki/Paesaggio\\_con\\_fiume#/media/File:Paisagem\\_do\\_Arno\\_-\\_Leonardo\\_da\\_Vinci.jpg](https://it.wikipedia.org/wiki/Paesaggio_con_fiume#/media/File:Paisagem_do_Arno_-_Leonardo_da_Vinci.jpg)> (accessed January 15, 2023).

the relationship between natural and anthropic components. Prior to this conceptual development, both culturally and in the Italian regulatory context, the meaning of landscape was linked to vision and gaze. In the laws of the first half of the twentieth century, aimed at the protection of the landscape, “the panoramic beauties”, the “natural paintings” and the “point of view” are clearly mentioned [5]; therefore there was a semantic meaning connected to the stillness of the perspective point of view that the observer could assume with respect to portions of the territory considered of interest [Colaceci 2022a, pp. 145-158]. This demonstrates how much the relationship between the point of view and the landscape has a cultural root and historical value, even though the concept of landscape has currently undergone an evolution.

### Landscape and point of view

In the representation of landscapes from above, the scalar dimension, the topography, the natural traces and the anthropic signs, the large environmental presences and the urban agglomerations assume importance. The Drawing is able to unravel this complexity, allowing the different elements to be separated in order to appropriately judge their qualities and connections.

The *Paesaggio sul fiume*, created by Leonardo da Vinci in 1473 (fig. 1), is a perspective representation from above that manages to effectively describe and communicate, through ink strokes, the physical-naturalistic spatial articulation and anthropic organization. The design captures and restores the landscape connotation characterized by a built settlement, cultivated fields in the valley which mark the texture of the soil and the surrounding hills with their tree masses.

At the end of the 16th century, landscape painting spread and despite being mainly aimed at commercial purposes, produced important graphic works for reading, understanding and analyzing the urban and territorial environment through pseudo-perspective representations [Docci, Maestri 1993, p. 157-162]. In the seventeenth century, the progress of instruments in the topographical field and a greater awareness in the geometric-perspective field favored the development of urban and territorial maps. The prevalent typology of these maps is characterized by pseudo-perspectives with a medium-high point of view [Docci, Maestri 1993, p. 148-156]. The passage from the



Fig. 2. Aerial photogrammetric image of the area near the current Parco delle Tombe Latine in Rome acquired with a flight by S.A.R.A. Nistri of 1932 (ICCD National Aerial Photo Library, sheet 150, streak 41, positive 786, negative 117079\_0).





perspective representation to the planimetric map with a zenithal point of view occurred in the XVIII century, therefore there was greater attention to the rational aspects, to the true form of the urban and territorial areas, to the technical representation with appropriate graphic codes, at the base of which there were survey operations [Emler, Sargenti 1992, pp. 290-306]. At the beginning of the 20th century considerable aerial reconnaissance began which marked an important stage in the production of maps using the aerophotogrammetric method (fig. 2). When we talk about the representation of landscape from above, beside the analytical-scientific field of investigation, reading and restitution of the existing we cannot ignore all those fields in which artists above all have approaches, methods and graphic elaborations for expressive and interpretative purposes.

Mario Giacomelli, during a plane trip, took photographs to distract himself from the flight, which gave rise to the idea of observing the landscape from a high point of view, which he led to the series *Paesaggi dall'alto* (1975) (fig. 3). This thought constituted the founding idea of *Presa conscience sulla natura* (1976-1980), in which the will to abstract the landscape taken from above reached the most mature results [6].

Similarly, Superstudio's *Il Monumento Continuo: New York* (1969), *Niagara* (1970), *Le dodici Città Ideali* (1971) reveal not only the group's thought on architecture and the city, but reveal the powerful figurative charge present in the representation of landscapes from above implemented with photomontages. In these cases, the representation arises as a deliberately compositional figurative act in which subtractions, combinations, additions and contaminations take place. The different forms and modalities of the graphic product imply a design act with exploratory purposes of the graphic sign.

In Archigram's *Plug-In City* (1964), the visionary project of the city, created with axonometric collage from above, shows a representation of the urban landscape in which the machine functions as an ideal and functional device for the construction, for the assembly of the components urban and its reconstruction.

The Drawing (digital/analog, of the existing/of the project) stands as evidence of the formalization of an expressive, compositional and exploratory intentionality which, in this case, concerns the representation and interpretation of real or imaginary landscapes.

Zoe Wetherall, with the *Earth* series (2018), photographed landscapes from above mainly with a zenithal

Fig. 3. Mario Giacomelli, *Paesaggi dall'alto*, 1975 (Mario Giacomelli Archive).

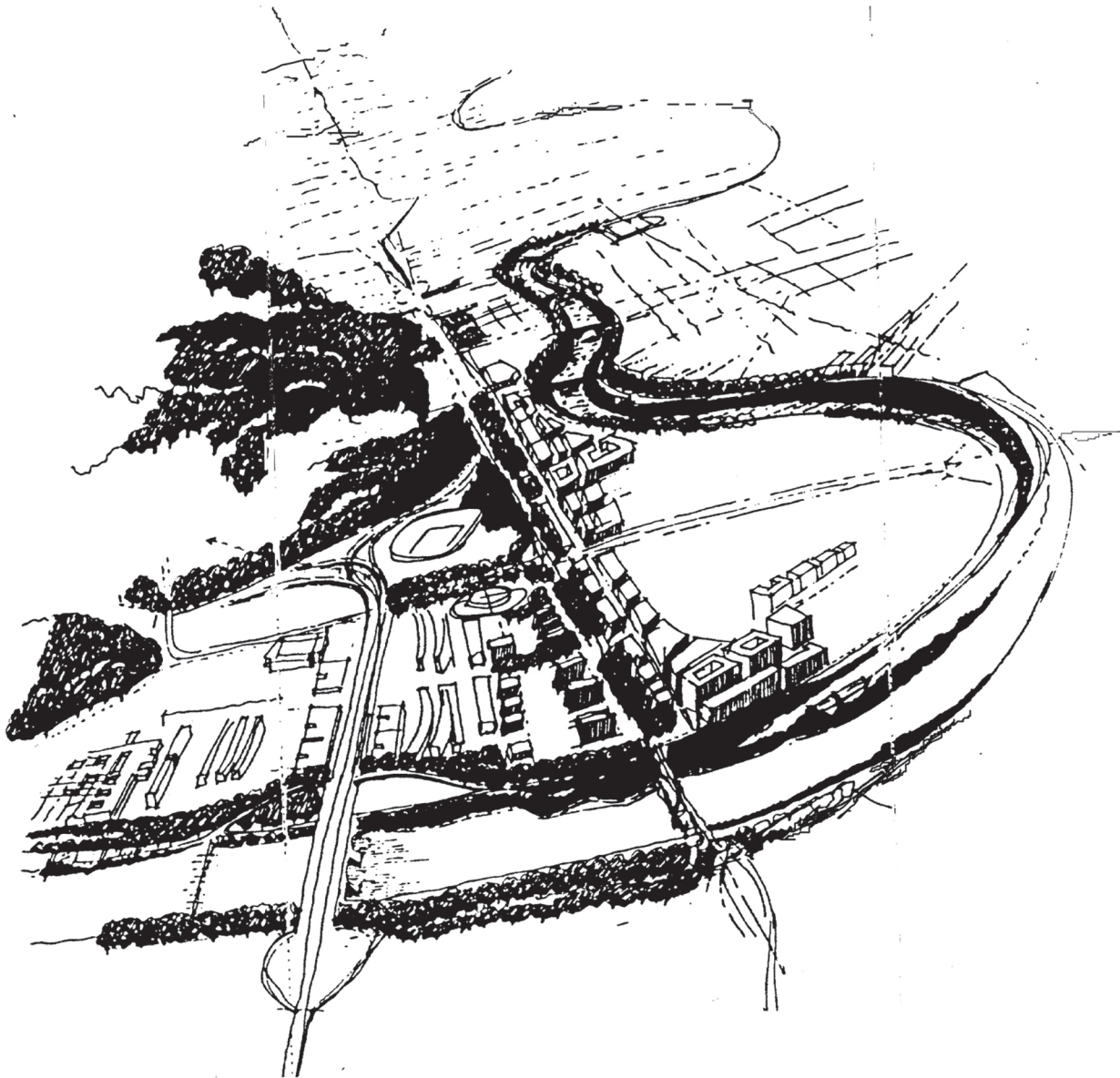


Fig. 4. Bird's eye view of the area between Ponte Milvio and Piazza del Popolo in Rome (drawing by Maria Grazia Cianci).



Fig. 5. Bird's eye view of the area between the Parco delle Tombe Latine towards the Roman countryside (drawing by Sara Colaceci)



point of view at a short distance from the object being photographed, emphasizing lines, figures and geometries, natural and anthropic [7]. These experiences, as well as those by Ryan Koopmans [8] and Ashok Sinha [9], testify that the link between the representation of the landscape and the point of view is articulated in multiple varieties in which the expressive-figurative character is evident and how this has a clear intentionality from beginning of its genesis. In this vein, the representation of landscapes is not merely imitative, but from the outset consciously interpretive and, therefore, already part of an inventive-creative process. The whole, as well as recalling the unanimity of the physical relationships of the elements, alludes to the abstract nature of the same signs with graphic and visual values [Cianci 2008].

The Drawing, through synthetic representations from above, is able to grasp the structural elements of the physical and urban organization, the prevailing natural components and the building fabric, as well as the relationships that are established between one and the other (figs. 4, 5).

### State of art

Interest in landscape issues has increased over the last few years. This is due not only to economic and social dynamics and territorial transformations, but also to greater attention to climate change, urban green spaces, the historical-archaeological pre-existence evidence of ancient landscapes, the environmental ecosystems that structure entire territorial portions becoming habitat of numerous living species. Therefore all processes aimed at safeguarding and enhancing the landscape become priorities in environmental management policies. The policies are implemented through monitoring, documentation and analysis operations which require adequate tools and methodologies.

In this regard, there is an increase in the use of UAVs (Unmanned Aerial Vehicles) with aerial photogrammetric acquisition aimed at monitoring, evaluation and protection and recovery actions. Numerous national and international research deals with these issues involving multiple fields. UAV is used to map and identify plant species [Baena et al. 2017, p. 1-2; Dunford et al. 2009, p. 4915-4935; Gini et al. 2018, p. 1-18; Gini et al. 2014, p. 251-269; Guerra-Hernández et al. 2017, p. 1-19], to monitor the phenomena of erosion and alteration of the coastal strips [Bazzoffi 2015, pp. 1-18; Gonçalves, Henriques 2015, pp. 101-111; Long et



Fig. 6. Image acquired with UAV of the mausoleum of Sant'Urbano, at the IV mile of the via Appia Antica inside Parco Archeologico dell'Appia Antica in Rome.



Fig. 7. Orthophotoplan obtained by integrating data acquired with UAV and terrestrial laser scanner (graphic elaboration by the authors).

al. 2016, p. 1-18; Pagan et al. 2019, p. 1034-1045], to identify areas with agricultural crops [Wang et al. 2022, pp. 1-12]. UAV instruments are used for geospatial surveys aimed at census through the use of information systems to promote landscape management [Colaceci 2022b, pp. 109-146; Doria, La Placa, Woodpecker 2022, pp. 73-80]. In other researches, these technologies are aimed at the survey for at the production of archaeological cartographic data [Ronchi, Limongello 2020, pp. 142-149], the enhancement of the historical landscape [Pirinu, Argiolas, Paba 2020, pp. 306-315] and the 3D reconstructions of archaeological sites [Ferreya et al. 2020, p. 317-323].

The progress in the technological filed has made it possible to test survey operations with LiDAR (Light Detection And Ranging) technology in various applications. LiDAR technology is used for palimpsest reading and landscape component analysis, to determine topographic trends, map landscapes, visualize urban design, carry out territorial analyses, monitor coastal dynamics, integrate data with multibeam technology [Bosman et al. 2015; Johnson, Ouimet 2018, pp. 32-44; Mahmoud et al. 2021; Pérez Alberti 2022; Romagnoli et al. 2013; Ronchi, Limongiello, Barba, 2020, pp. 1-25].

The applications make it possible to facilitate the reading of large-scale ecosystems and to create thematic maps useful for understanding the territorial structures. Land cover mapping is required for many applications such as landscape planning, landscape ecology, agricultural management and forestry.

Documenting and monitoring are necessary actions for: the protection of the natural and anthropic territorial heritage, territorial planning, conscious management, actions aimed at recovering and enhancing the landscape.

This articulation of fields of interest, technologies and methodologies requires the presence of specialist figures belonging to multiple disciplinary sectors. The Drawing sector, as a cognitive means of reality existing at different scale dimensions, has always established a dialectical relationship with environmental contexts, therefore it can support and can play a critical role within these processes.

### Landscape explorations

In the context of analysis, reading and knowledge of the landscape and its natural and anthropic components, the Department of Architecture of the University of Roma Tre



has been carrying out various researches for some years with multiple tools, methodologies and purposes, also in collaboration with other departments.

In the *Accordo di collaborazione scientifica per l'attività di studio, rilievo e analisi monumentale del Mausoleo cd. di Sant'Urbano al IV miglio della via Appia (Roma)*, stipulated with the Parco Archeologico dell'Appia Antica, the integration of UAV and terrestrial laser scanner is aimed at the graphic rendering of a piece of the historic Roman landscape characterized by archaeological presences (the mausoleum, portions of the Roman paving connecting the site with the via Appia Antica, a section of the via Appia Antica) and by heterogeneous tree elements [10]. The survey of the site assumes important value since it arises as the first act of investigation after the area was acquired by the Italian State for the park, since it was previously privately owned. The methodology envisaged: acquisition of UAVs and laser scanners to obtain a single complete numerical model of the lower and upper parts of the mausoleum; point cloud management; CAD restitution; elaboration of orthophotoplans

The elaboration of a single point cloud has allowed the import into the CAD environment for the two-dimensional vector graphic restitution of the area in question. This was done through planimetry (plan at height of + 1 meter with respect to the internal altitude of the mausoleum), 10 sections including the mausoleum and site in its entirety. In addition, the restitution of the mausoleum wall typologies was carried out through orthophotoplans elaborated from UAV acquisition.

The research, used consolidated acquisition methodologies, is placed with relevance in the context of the survey of an area that has an important historical, cultural and landscape value. It constitutes a necessary operation for all future archaeological investigations and urban analyzes of the relationships between the site, the mausoleum and the via Appia Antica (figs. 6, 7).

The COSTA-Med research project [11] is aimed at developing methodologies for the analysis of coastal territories to support strategic transformation and adaptation to climate change in the Western Mediterranean, on the case study of the Lazio coasts of the Pontine-Roman sector (fig 8). Issues relating to the evolution of coastal areas in relation to climate change are high on the political agenda of many countries (fig. 9).

The project, currently in its first phase, has the following specific objectives: recognition of national and interna-

tional projects of some coastal cities and regions; survey of the coastal strip under investigation aimed at mapping and monitoring the evolution of the coastline; creation of a simulator of the vulnerability of coastal territories in Web-GIS which graphically represents the levels of risk; creation of interactive 3D models of the coastal strips for the three-dimensional investigation of the territorial areas analyzed.

The methodology includes: the acquisition of the survey area with LiDAR technology; point cloud management; the data processing in GIS for the development of a Web-GIS platform for technical-administrative support and for dissemination usable by the communities.

The coasts represent an area particularly susceptible to the impacts of climate change as they constitute the transition zone between land and sea. Therefore, the coasts are affected by the consequences of two different environments, and host varied climatic processes that make them highly dynamic areas. The analysis of the vulnerability of the ecosystem services present in the Lazio coastal area, in particular in the Pontine/Roman sector, includes, in addition to the environmental aspects already being studied, also the anthropic and cultural heritage: therefore, it focuses attention on the repercussions that environmental phenomena (such as coastal erosion, sea level rise) would have on cultural landscapes, as well as on coastal urban centers.

These researches aim to confirm the central role of knowledge and documentation in the fields of study of environmental contexts, an indispensable condition for any management, safeguard, requalification and enhancement action.

## Conclusions

In continuous oscillation between art and science, the exploratory nature of the representation of landscapes from both the more properly expressive and interpretative aspects and the analytical and cognitive one of the environmental contexts. It is a multifaceted dimension that includes diversified scopes, purposes and means.

Having ascertained the historical-cultural link between point of view and landscape, the representation of the landscape can follow multiple objectives through different tools and methodologies also depending on the type of result or graphic product that is intended.

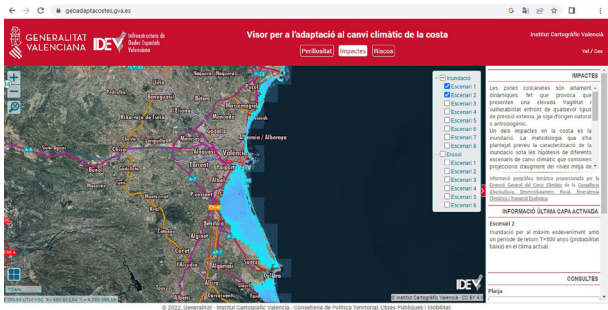


Fig. 8. Map of the Roman-Pontine sector with vulnerability levels highlighted (graphic elaboration by Leopoldo Franco).

Fig. 9. WebGIS for coastal climate change adaptation of the city of Valencia with future risk scenarios: <<https://geoadaptacotes.gva.es/>> (accessed March 2, 2023).

The disciplines of Drawing assume a central role in the reading and interpretation of environmental contexts. This is clearly stated in the representation of landscapes from above thanks to the synthesis necessary to elaborate subsequent reflections and research; this aspect is strengthened with the help of new technologies.

The complexity of the contemporary landscape is determined by the articulated set of modern anthropic, historical-archaeological, plant, biophysical, geo-morphological components. The landscape is characterized by heterogeneity and complexity, therefore its representation in the context of processes aimed at documentation and knowledge requires the ability to integrate tools, methodologies and multiple disciplinary fields.

In all operations directed towards the analytical-cognitive aspects of urban, territorial and landscape phenomena supported by the Representation sector, the actions of safeguarding, managing and enhancing environmental contexts become of fundamental importance.

Data acquisition and processing methodologies, management systems and digital models are aimed at promoting the reading, analysis and monitoring of the landscape cultural heritage. The knowledge procedures of the environmental contexts can be efficiently supported and implemented by the set of acquisition, processing and interpretation operations that belong to the Representation sector. Currently the issues of knowledge and enhancement of the landscape are prominent in national and international policies, as demonstrated by some objectives of the PNRR, including: protection and enhancement of historical and cultural areas (Mission 1, component 3); environmental protection for the reduction of hydrogeological risks (Mission 2, component 4) [12].

Representation disciplines can support such goals as they have traditionally been advocates of the needs of the community towards the exploration and analysis of environmental heritage. In the analytical field, the role of the Representation disciplines has the obligation to ensure critical guidelines that must favor the objectives of knowledge, reading and documentation through the graphic languages, the means and the theoretical principles that belong to them. These include not only important tools and operations for reading existing values but, in a broader sense, the value of a cognitive means of territorial structuring and the origin of urban and environmental organizational forms.

## Notes

[1] The law 08/08/1985 n. 431 or Galassi law, extending the constraint of law 06/29/1939 n. 1497 to entire territorial areas, marks the beginning of the evolution of the concept of landscape in a contemporary sense.

[2] <<https://www.premiopaesaggio.beniculturali.it/convenzione-europea-del-paesaggio/>> (accessed May 25, 2023).

[3] <[https://www.italianostraeducazione.org/wp-content/uploads/2019/01/004\\_Carta\\_di-Napoli.pdf](https://www.italianostraeducazione.org/wp-content/uploads/2019/01/004_Carta_di-Napoli.pdf)> (accessed May 25, 2023).

[4] <<http://archeologiamedievale.unisi.it/NewPages/Testipaesaggio/ATTI.PDF>> (accessed May 25, 2023).

[5] Law 29 June 1939, n. 1497 *Protezione delle bellezze naturali*: "Art. 1. The following are subject to this law due to their considerable public interest: [...] 4) panoramic beauties considered as natural landscapes and likewise those points of view or belvedere, accessible to public, from which one can enjoy the spectacle of those beauties".

[6] <<https://www.archiviomariogiacomelli.it/paesaggi-dallalto-1975/>> (accessed January 15, 2023).

[7] <<https://www.frontroomles.com/zoe-wetherall-earth>> (accessed February 23, 2023).

[8] <<https://www.ryankoopmans.com/>> (accessed February 23, 2023).

[9] <<https://www.frontroomles.com/ashok-sinha-strata>> (accessed February 23, 2023).

[10] Responsible: Maria Grazia Cianci. Components: Maria Grazia Cianci, Stefano Botta, Daniele Calisi, Sara Colaceci.

[11] Research project born from the collaboration between the Engineering Department of the Roma Tre University, the Architecture Department of the Roma Tre University, the Architecture Department of the G. d'Annunzio University of Chieti - Pescara.

[12] Component 3 of Mission 1: Turismo e Cultura 4.0. See PNRR 2021, p. 89. Component 4 of Mission 2: Tutela del Territorio e della Risorsa Idrica. See PNRR 2021, p. 122.

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