

Digital Cataloguing of Historic Parks and Gardens in Piedmont (Italy) Using Open-Source Data

Filiberto Chiabrando², Erica Casareto², Chiara Graziani¹, Andrea Maria Lingua¹, Paolo Mamino², Francesca Matrone¹, Barbara Deborah Viola³

¹ Politecnico di Torino, Italia, Dipartimento di Ingegneria dell'Ambiente, del Territorio e delle Infrastrutture – (andrea.lingua, francesca.matrone, chiara.graziani@polito.it)

² Politecnico di Torino, Italia, Dipartimento di Architettura e Design – (filiberto.chiabrando, erica.casareto, paolo.mamino@polito.it)

³ Regione Piemonte, struttura Coordinamento attuazione del PNRR in materia di cultura – (barbaradebora.viola@regione.piemonte.it)

Keywords: Historical Gardens, Historical Parks, PNRR, ICCD Application, Cataloguing, Piedmont Territory and Heritage.

Abstract

Historic parks and gardens represent a significant cultural, environmental, and social heritage, serving as living testimonies to landscape art, biodiversity, and historical memory. Their preservation and valorisation are essential for fostering sustainable tourism, enhancing local identity, and mitigating the impacts of climate change on fragile ecosystems. Italy holds a rich heritage of public and private historic gardens. Despite previous efforts, Italy lacks a comprehensive and standardised national catalogue for these sites, hindering effective conservation and management.

This study presents the digital cataloguing of historic parks and gardens in Piedmont (Italy) as part of Italy's National Recovery and Resilience Plan (PNRR) under the Next Generation EU program. The project, aligned with the "*Istituto Centrale per il Catalogo e la Documentazione*" (ICCD) standards (PG 4.01 sheets), aims to create a unified, georeferenced database using an open-source GIS platform. A multidisciplinary approach integrates historical, botanical, and territorial data from public inventories, cultural associations, and prior studies. The initiative focuses on 400 sites selected for regional balance, beginning with UNESCO-listed landmarks like the Reggia di Venaria Reale.

The resulting digital catalogue will support heritage planning, promote cultural tourism, and ensure adaptive conservation strategies. By establishing shared standards, this project contributes to a dynamic, accessible national database, reinforcing the role of historic gardens in sustainable development and cultural continuity.

1. Introduction

Historic parks and gardens represent a critical component of cultural heritage, embodying artistic, environmental, and social values that transcend their aesthetic function. Recognised by ICOMOS in the *Florence Charter (1981)* as "*living monuments*", these landscapes require systematic documentation to ensure their preservation in the face of urbanisation, climate change, and ecological degradation (ICOMOS, 1981). Scholars such as Cazzato (2016) and Conan (1999) emphasise their dual nature as both cultural artefacts and dynamic ecosystems, necessitating interdisciplinary approaches that integrate historical, botanical, and ecological methodologies (Treib, 2011; Turner, 2005). This duality complicates conservation efforts, as gardens evolve biologically while their design remains historically fixed (Woudstra & Hitchmough, 2004).

The cultural-artistic dimension of historic gardens is well-documented in art historical studies (Mosser & Teyssot, 1991), while their ecological dynamism requires continuous monitoring (Sarlöv Herlin, 2016). The intersection of these aspects demands interdisciplinary cataloguing frameworks, as proposed by Laird (1999) and further developed in Landscape Archaeology (Fairclough et al., 2018).

Digital technologies, particularly GIS, LiDAR, and HBIM (Historic Building Information Modelling), have revolutionised heritage documentation by enabling high-precision geometric and cartographic recording. 3D digital surveys enhance the understanding of spatial relationships in historic gardens, while open-access geodatabases facilitate long-term monitoring (Campanella and D'Agostino, 2021). The London Charter (2009) and Seville Principles (2011) provide guidelines for ensuring scientific rigor in digital reconstructions (Denard, 2012).

The upkeep of historic gardens requires substantial financial and energy resources (Tschumi, 2018). Publicly owned sites often rely on state funding and tourism revenues (Taylor, 2009), while private estates face sustainability challenges (Rakic & Chambers, 2007). Public-private partnerships (PPPs) have emerged as a viable model (ICOMOS-IFLA, 2017), though long-term maintenance remains problematic (Ghelardi, 2020).

The need for safeguarding historic gardens is underscored by international conventions (e.g., *European Landscape Convention, 2000*; *UNESCO World Heritage Guidelines, 2015*). Risk assessment methodologies, such as those developed by ICORP-ICOMOS (2020), help mitigate climate-related threats (Petzet, 2008). Participatory governance models involving local communities are increasingly advocated (Ripp and Rodwell, 2015).

The ICCD's PG 4.01 standard (2018) provides a structured cataloguing format, but interoperability with European databases (e.g., *Europeana*, *ARIADNE*) remains a challenge (Börner et al., 2020). Open-access platforms, as promoted by the European Commission (2021), democratize heritage knowledge, fostering public engagement and sustainable tourism (Smith, 2006).

1.1 The Italian Context: PNRR and Next Generation EU Initiatives

The Italian Government (2021) has prioritised the documentation of historic parks and gardens under the National Recovery and Resilience Plan (PNRR), funded by the Next Generation EU program. Specifically, Mission 1, Component 3 (M1C3), Measure 2.3 focuses on cataloguing these sites to enhance their cultural, environmental, and economic value (Italian Government, 2021) whose goal is to have a quantitative knowledge of the Italian heritage, to strengthen the cultural,

historical and environmental values of historic gardens and parks, with a view to their correct maintenance, management and public use, also with a view to tourist use. The aim is to combat urban decay and restore shared identities of places, creating new opportunities both to relaunch local economies and mitigate the impact of the crisis and to strengthen skills in the management and maintenance of historic parks and gardens.

Italy is in fact rich in public and private historical gardens and parks. For this reason, in past years many cataloguing actions have been carried out in order to have a clear knowledge of this heritage, both from Institutional bodies and from individual researchers. Despite these results, the need was felt to have a national catalogue with homogeneous standards, always available online by the highest number of involved actors, and updated at the current state of art, since an historical garden is an entity that changes over time, and it is more sensitive to environmental pollution and climate alterations.

The ICCD plays a central role in this initiative, ensuring that data collection meets national standards while remaining compatible with European frameworks. The project's objectives include:

- Creating a unified digital inventory to combat knowledge fragmentation.
- Supporting sustainable tourism and local development.
- Establishing best practices for adaptive conservation, particularly in response to climate change.

The Census activity is coordinated, on a national scale, by the Italian Ministry of Culture, with the support of ALES (*Arte Lavoro e Servizi SpA*) and scientific collaboration of APGI (*Associazione Parchi e Giardini di Italia*). It will be realized by Italian Regions and Autonomous Provinces, with a total number of 8371 gardens and parks.

By bridging gaps in documentation and standardisation, this research contributes to the PNRR's broader goals of heritage valorisation, while setting a benchmark for future cataloguing efforts in the field.

2. Methodology

2.1 The selection criteria in Piedmont study area

This study presents the digital cataloguing of historic parks and gardens in Piedmont, Italy, using ICCD's PG 4.01 standards within a GIS-based open-source platform. The methodology integrates archival research, geospatial analysis, and stakeholder collaboration to ensure accuracy and usability.

The 400 historical gardens and parks were chosen for the cataloguing process, distributed across all provinces (Figure 1), for a territorial representation as homogeneous as possible. Specifically, the Metropolitan city of Turin has the highest number of sites, 146, followed by Cuneo's province with 63 parks and gardens, 53 in Novara, 47 in Alessandria, 29 in Biella, 28 in Verbania-Cusio-Ossola, 21 in Asti and 13 in Vercelli.

The region provided a list of all private and public historical gardens and parks in the territory. For the cataloguing process,

we gave priority to the public heritage. Inside this list we can find some useful information, like the address of the residence, the legal condition – if the site is private or public, and the details of the protection order (such as the date of the decree), which serve as a useful starting point for further research on the Italian Ministry of Culture's "Vincoli in Rete" portal. From there, it is often possible to access the full protection decree, which frequently includes the historical-artistic report and the boundary map of the protected area based on cadastral data.



Figure 1. The localisation of the provinces of the Piedmont region (Italy) in the World.

We started the selection guided by a very authoritative publication, "*Ville, parchi e giardini per un atlante del patrimonio vincolato*" (Cazzato, 1992) (1), comprehensive of public and private gardens and parks. Another important and more recent publication that we consulted is "*Atlante dei giardini del Piemonte*" (Lodari, 2017). (2)

All public historical gardens and parks present in the list provided by the Region were inserted in our list, even those gardens who had a previous sheet, which are 24 sites.

We then considered PNRR-funded cultural heritage, obliged to guarantee access to the public.

For the open-to-the-public private heritage we consulted the list from different private associations that deal with the cultural valorisation, which are FAI (*Fondo Ambiente Italiano*), ADSI (*Associazione delle Dimore Storiche Italiane*), GGI (*Grandi Giardini Italiani*). Since the mission of these associations is to disclose the Italian heritage, the information coming from these sources are easier to obtain.

2.2 ICCD web application

All information collected for each historical garden and park, regarding its location, time period, conservation state, cultural and vegetation elements, and so on, was entered into a web application for cataloguing, provided with GIS technology for the geo-localisation of the elements of interest and with cartographic support like Open Street Map (OSM) and Google Maps.

The adoption of open-source basemaps instead of large scale municipal technical maps was driven by three critical factors:

- the absence of a standardized high-resolution (1:5000-1:2000 scale) national base mapping in Italy, while

(1) Vincenzo Cazzato is a distinguished Italian architectural historian and expert in historic gardens, full professor of Architectural History at the University of Salento, where he also taught "Garden Art" and "Landscape Architecture." He collaborated with ICCD for the creation of the guidelines and of the cataloguing sheets.

(2) Renata Lodari is a renowned Italian landscape architect and scholar, specialising in the conservation and enhancement of historic gardens and cultural landscapes. Throughout her career, Lodari has held significant roles: she served as an official in the Parks Service of the Piedmont Region, contributing to the establishment of the Regional Parks Plan. In 1980s and 1990s, she filled out some cataloguing sheets for Ex Soprintendenza Beni Ambientali e Architettonici, including Villa della Regina, the park of the Castle of Racconigi and the park of the Castle of Agliè (Savoy residences).

somelocal municipalities maintain such data, coverage is patchy and lacks national uniformity, with national agencies only producing maps at 1:25000 scale and regional authorities typically limited to 1:10000 scale due to budget constraints (ICCD Technical Report, 2022);

- the outdated nature of existing official cartography in many areas, where maps may be decades old and no longer reflect current conditions;
- cartographic consistency across all catalogue records nationwide is needed, which is best achieved through a unified basemap solution. While AGEA's nationwide orthophotos at a suitable scale exist, they are not publicly accessible despite being publicly funded, making OSM/Google Maps the only viable option for comprehensive, up-to-date coverage.

The interface of the web application consists in the PG 4.01 cataloguing sheet, elaborated from the previous version PG 3.00, in view of the national census activity. The record has been reorganised in terms of information sequence and simplified in some areas (partly through the merging of fields), while also being enriched by including new entries and, above all, controlled vocabularies. The revision also considered the need to systematically retain the information contained in previous versions of the standard, so as not to lose valuable data during the review and updating of existing records.

It is worth noting that the web application developed is periodically updated based on the feedback provided by cataloguers to the General Secretariat, highlighting the participatory nature of the process and its ongoing refinement. Cataloguing activities can be carried out either in a simplified form, by completing a single form to describe and document the asset, or by applying the procedure for complex assets, which involves the creation of an overall form ("*scheda madre*", mother sheet) accompanied by additional forms for the individual components ("*schede figlie*", subsidiary sheets), allowing for a more detailed and structured documentation.

The sheet gives an overall description of the site, filling out some fields: the record is composed of closed fields, where entries can be selected from a drop-down menu or entered manually by the operator, and open descriptive fields, which allow for an overall representation of the asset and its components, making it easier to interpret, while preserving the analytical nature of the record. The most important fields are mandatory, while other fields are recommended because not all information are always available, especially for private gardens.

When opening a new sheet, the first step consists in locating the area of the garden or park. There can be a single area or a multi-area, without considering buildings connected to the site (Figure 2). It can be drawn directly into the GIS application, or it can be imported as .json file. Once the area is defined, the application guides the cataloguer for filling the sheets with all geographical, topographical and cadastral information regarding the historical garden or park (Figure 3). Furthermore, the cataloguer proceeds with the filling of all other attributes, regarding:

- the typological definition of the asset.
- the geographical and administrative location of the site.
- the cadastral location.
- the georeferencing.
- analytical data, where we insert the general description of the site, historical-critical notes.
- physiognomy of the green area, describing the botanical species, vegetal structures and green spaces.
- technical data, specifically regarding the area of interest and the measurement of its surface.

- chronological framework.
- the actual use and fruition.
- current state of conservation.
- existing constraints and administrative provisions.
- attached documentation, like photos, reports, videos, and bibliography.
- type of data access to protect sensitive private information.
- detail related to the cataloguer.

The list of monumental trees was also taken into consideration. In Piedmont, there are 378 such trees, protected by law as common goods due to their naturalistic, landscape, and historical-cultural value. Their educational significance and potential role in promoting environmentally sustainable tourism in rural areas were also highlighted (Figure 4).

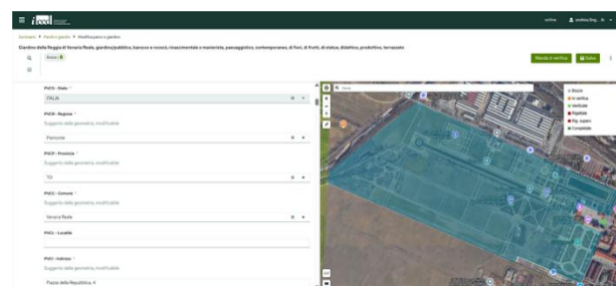


Figure 2. Perimeter of the area.

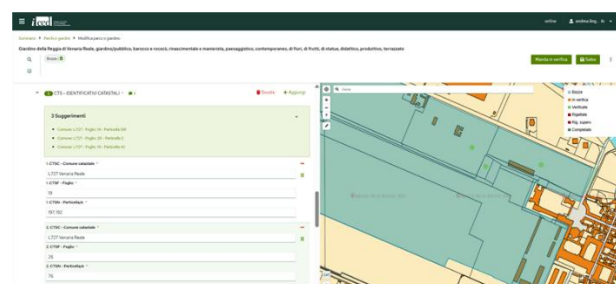


Figure 3. Interface of the web application by ICCD.

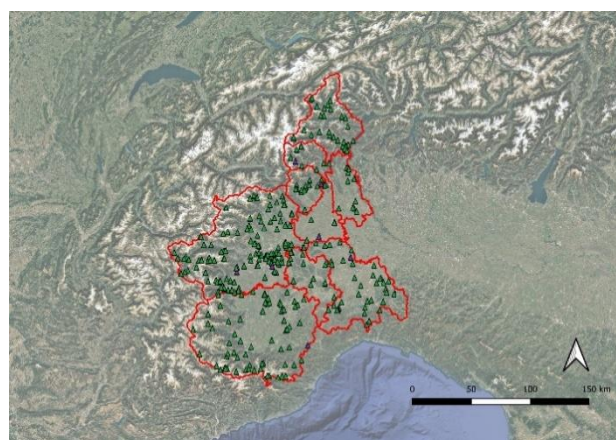


Figure 4. Monumental trees in Piedmont (Regione Piemonte).

For reasons of time and accessibility to the sites and their archives, information about parks and gardens has been acquired mainly through publications, official websites, theses, and online information. Nevertheless, inspections were conducted at some sites to document the gardens through up-to-date photographs and verify their present condition.

We conducted surveys independently for public sites, for which obtaining permission to visit was not difficult, while for private

gardens, it was necessary to organise an on-site inspection in coordination with the property owner.

When the sheet is completed, it undergoes two levels of verification, one from a local scientific verifier and the other one from the Ministry of Culture.

Once the sheet is verified, it is then published by ICCD. On the application's homepage, it is possible to view the progress of the data entry process across Italy (Figure 5), along with a heatmap showing the geographical distribution of the surveyed gardens (Figure 6).

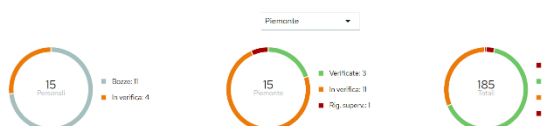


Figure 5. State of progress of the census activity.

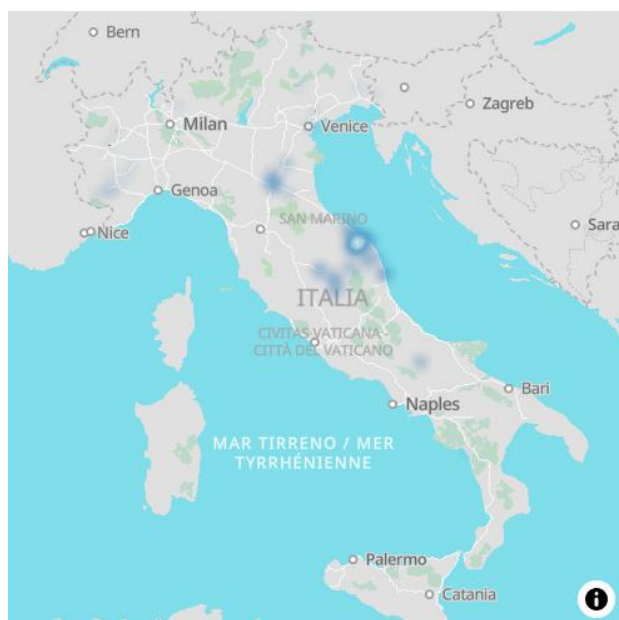


Figure 6. Heatmap of the surveyed gardens and parks.

3. Case study

After an early stage of analysis of the list of historical gardens and parks proposed by Piedmont region, we completed the first cards starting from some of the most important sites, like the Royal Residences located in Turin, part of UNESCO heritage list. The first published sheet is the Garden of Reggia di Venaria Reale, one of the Royal Residences (Figure 7).

The gardens of the Reggia di Venaria Reale are today an extraordinary achievement, especially when considering the condition of the area in the early 2000s, when it was no longer possible to perceive even the fragments of the original 17th- and 18th-century layout. Following the inclusion of the Savoy Residences in the UNESCO World Heritage List in 1997, the gardens underwent a major restoration project. Inaugurated in 2007 and having passed through an initial phase of stabilisation, the gardens have now entered a significant stage of growth and evolution, representing a unique case within the context of Europe's great historic gardens.

It was decided to start with the gardens of Reggia di Venaria Reale, motivated by the garden's large size and its articulation into multiple sections, making it an especially comprehensive test case for both the application and the PG 4.01 survey form.

Furthermore, seen the proximity of this site and the public accessibility, we were able to visit the Reggia di Venaria several times. It was then easy to acquire a lot of information for filling the cataloguing sheet, despite the complexity of the site.



Figure 7. Gardens of the Reggia di Venaria Reale.

The survey form was structured around the following key elements:

- area delimitation: there is a single area of more than 760.000 m² divided in multiple spatial units where we identified distinct functions, characteristics of the vegetation and characterizing elements (Figure 8).
- chronology and sources: the historical stratification of the garden was reconstructed from its 17th-century foundation onward, through the analysis of iconographic and cartographic sources preserved in archives.
- defining elements: the form includes descriptions of perspective avenues, tree-lined paths, fountains, sculptures, pavilions, and the plant species used in recent restoration works.
- state of conservation: the garden is generally well preserved, although some issues remain.
- documentary apparatus: the form is supplemented with detailed photographs, contemporary plans, bibliographic references, and links to online documentation.

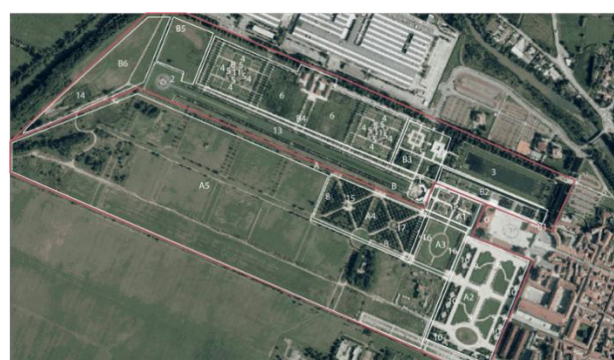


Figure 8. Multiple area units of the Reggia di Venaria.

Completing the cataloguing form (Figure 9 and figure 10) made it possible to assess the effectiveness of the application in managing complex landscape contexts, also helped by the georeferencing tool for visualizing and interpreting the garden's various components. At the same time, a constant comparison with historical documentation, attached in the application, avoided oversimplification in the description and interpretation of the site.



01

Giardino della Reggia di Venaria Reale

giardino/ pubblico, barocco e rococò, rinascimentale e manierista, paesaggistico,
contemporaneo, di fiori, di frutti, di statue, didattico, produttivo, terrazzato, in connessione
con un palazzo

Piemonte, Venaria Reale (TO); Piazza della Repubblica, 4

XVII; 1658-1679

proprietà Stato

<https://catalogo.beniculturali.it/termini-uso>

01

Pagina 1 di 18

CD - CODICI	
TSK - Tipo scheda	PG
LIR - Livello catalogazione	C
NCT - CODICE UNIVOCO	
NCTR - Codice Regione	01
ESC - Ente schedatore	R01
ECP - Ente competente per tutela	S251
OG - BENE CULTURALE	
AMB - Ambito di tutela MiC	architettonico e paesaggistico
OGT - DEFINIZIONE BENE	
OGTD - Definizione	giardino
OGTT - Tipologia/altra specifiche	pubblico, barocco e rococò, rinascimentale e manierista, paesaggistico, contemporaneo, di fiori, di frutti, di statue, didattico, produttivo, terrazzato
OGTE - Connessioni significative con un edificio	in connessione con un palazzo
OGD - DENOMINAZIONE	
OGDT - Tipo	attuale di uso corrente
OGDN - Denominazione	Giardino della Reggia di Venaria Reale
LC - LOCALIZZAZIONE GEOGRAFICO - AMMINISTRATIVA	
PVC - LOCALIZZAZIONE	
PVCS - Stato	ITALIA
PVCR - Regione	Piemonte
PVCP - Provincia	TO
PVCC - Comune	Venaria Reale
PVCI - Indirizzo	Piazza della Repubblica, 4
PVZ - Tipo di contesto	contesto urbano
ACB - ACCESSIBILITÀ DEL BENE	
ACBA - Accessibilità	si
CS - LOCALIZZAZIONE CATASTALE	
CTS - IDENTIFICATIVI CATASTALI	
CTSC - Comune catastale	L727 Venaria Reale

01

Pagina 2 di 18

Figure 9. Part of the cataloguing sheets of Reggia di Venaria (1/2)

CTST - Tipo catasto	Catasto misto
CTSF - Foglio	19
CTSN - Particella/e	197, 192
CTS - IDENTIFICATIVI CATASTALI	
CTSC - Comune catastale	L727 Venaria Reale
CTST - Tipo catasto	Catasto misto
CTSF - Foglio	26
CTSN - Particella/e	76
GE - GEOREFERENZIAZIONE	
GEL - Tipo di localizzazione	localizzazione fisica
GET - Tipo di georeferenziazione	georeferenziazione areale
GEP - Sistema di riferimento	WGS84
GPT - Tecnica di georeferenziazione	rilevo da cartografia con sopralluogo
GPM - Metodo di posizionamento	posizionamento approssimato
GPB - BASE CARTOGRAFICA	
GPBB - Descrizione sintetica	OSM
GEN - Note	Area selezionata con un poligono su base OSM, dove, tramite sopralluogo, sono stati individuati i limiti dell'area: a nord la strada comunale, a ovest la Reggia e la città di Venaria Reale, a sud l'aeroporto di Venaria e a est il torrente Geronda.
DA - DATI ANALITICI	
DES - DESCRIZIONE DEL BENE	
	I Giardini della Reggia di Venaria Reale (DCMN122113) si estendono su di una superficie di ottanta ettari disposti su due livelli planimetrici. Sono composti da un disegno geometrico che riprende le linee storiche dei viali che lo componevano. Ogni episodio, che si inserisce nelle geometrie storiche, è stato riletto in chiave contemporanea, secondo la documentazione storica reperita. Un elemento centrale di unione tra il Parco Alto (A) e il Parco Basso (B) è la Fontana d'Ercole (1), un'opera architettonica polilobata che, al centro, ospita la statua di Ercole. La fontana è circondata dalle antiche strutture delle scale a collo d'oca che un tempo la sormontavano, ma che furono demolite nel

01

Pagina 3 di 18

DECZ - Descrizione	Formata dal tronco di un albero in bronzo poggiato al suolo e rivolto verso le profondità della terra. È delimitato da un'esedra di faggi rossi, speculare a quella posizionata all'ingresso. Le due esedre circoscrivono il perimetro dell'intero Giardino delle Sculture Fluide.
DEC - ELEMENTI DI ARREDO E ORNAMENTI	
DECU - Documentazione di riferimento	122123
DECH - Codice identificativo	B2
DECG - Genere	OPERE D'ARTE CONTEMPORANEA
DECT - Tipo	scultura
DECZ - Descrizione	Una scultura composta da un albero in bronzo, che sostiene una pietra tra i rami e da alcune pietre sparse sul suolo. In continuità con Cervello di pietre, è un pensiero sospeso nell'aria, in equilibrio tra forze contrapposte. La pietra, oltre ad indicare il peso della forza di gravità, rivela anche l'attrazione che la sostiene in alto, verso la luce.
MT - DATI TECNICI	
MIS - MISURE	
MISZ - Tipo di misura	area
MISU - Unità di misura	m2
MISM - Valore	756826
DT - CRONOLOGIA	
DTN - NOTIZIA STORICA	
DTNS - Notizia - sintesi	cronologia complessiva
DTZ - CRONOLOGIA GENERICA	
DTZG - Fascia cronologica /periodo	XVII-XXI
DTS - CRONOLOGIA SPECIFICA	
DTSI - Da	1658
DTSF - A	2025
DTM - Motivazione/fonte	analisi storica
DT - CRONOLOGIA	
DTN - NOTIZIA STORICA	

01

Pagina 18 di 28

Figure 10. Part of the cataloguing sheets of Reggia di Venaria (2/2)

4. Prospects

The ICCD form is an extremely effective tool for describing cultural heritage in Italy—particularly historic parks and gardens—and for cataloguing the national heritage. With its intuitive interface and integrated GIS application, it guides the user through the compilation process and allows for a comprehensive overview of the asset, ensuring that information can be continuously updated.

However, during our cataloguing activities, we encountered certain limitations, mainly related to the availability and accessibility of information. On the one hand, consulting bibliographic sources and online documents is a valuable way to streamline the work, especially considering the large number of gardens to be surveyed. On the other hand, there is the risk of relying on data that is not always up to date. For this reason, site visits are an essential tool for verifying the current condition of the gardens. These inspections, however, often take considerable time, as they must be arranged with the property owners, who are not always cooperative or may be difficult to contact.

It would therefore be desirable for the main institutions involved in the survey process to organize dedicated access days for cataloguers, in order to speed up on-site inspections. When access is denied, further difficulties arise in acquiring visual documentation: for privacy reasons, it is not permitted to use drones or other UAVs on properties that not only deny entry but also prevent exterior views due to high boundary walls or dense vegetation.

Aerial and terrestrial photogrammetry and laser scanning technology could be an adding value for a further knowledge of the asset. Parallel to the cataloguing process, surveys could be carried out to generate the 3D model of the garden or park, which would be valuable for documentation, management, and enhancement purposes. Furthermore, these instruments can help to detect degradation processes.

Finally, artificial intelligence could provide valuable support in this context, provided it is properly trained to retrieve updated and reliable information from authoritative sources. Looking ahead, it is hoped that the ICCD will integrate such technology into its system, in the form of a constantly available virtual assistant capable of supporting cataloguers in the search for documentation and assisting users in accessing information about a specific garden or park.

5. Conclusions

The ongoing project aims to develop an integrated database of all historical gardens and parks in Piedmont, contributing to the creation of a comprehensive national catalogue covering all Italian regions. This unified database is expected to enhance knowledge of this heritage, support territorial planning, and promote cultural and environmental values through coordinated strategies.

Although significant progress has been made, the cataloguing process is still underway. The dynamic nature of gardens, subject to continuous transformations and environmental pressures, makes this an evolving and long-term endeavour. The outcomes of the project will become increasingly visible over time, as more records are completed, verified, and made accessible through the ICCD platform.

It is hoped that the ICCD platform will be continuously updated, not only to improve the quality of heritage cataloguing, but also to incorporate innovative technologies capable of providing more comprehensive information about each historic garden or park, especially AI-based approaches.

Ultimately, the database will serve as a valuable resource to foster synergy among the various sites, enabling the allocation of

funding for conservation and valorisation, and supporting sustainable management practices. The hope is that this national database will make it easier to compare gardens across the entire country, in order to identify similar models and replicate effective operational frameworks even from one end of Italy to the other. All of this is aimed at strengthening the protection of a heritage that is as fragile as it is valuable and representative of our territory, considering that the currently catalogued gardens do not account for the entirety of the existing historic gardens.

Acknowledgments

This study is partially funded by the project the FAIR - Future Artificial Intelligence Research and received funding from the European Union Next-Generation EU (PIANO NAZIONALE DI RIPRESA E RESILIENZA (PNRR FAIR, CUP n. E13C22001800001) – MISSIONE 4 COMPONENTE 2, INVESTIMENTO 1.3 – D.D. 1555 11/10/2022, PE00000013). The data has been acquired in collaboration with the project "Parchi e giardini storici del Piemonte" funded by Regione Piemonte (Italy) and involves the Department of Environment, Land and Infrastructure Engineering (DIATI) and the Department of Architecture (DAD) of Politecnico di Torino University.

This manuscript reflects only the authors' views and opinions; neither the European Union nor the European Commission can be considered responsible for them.

References

- Cazzato, V., 1992: *Ville, parchi e giardini per un atlante del patrimonio vincolato*. Istituto Poligrafico e Zecca dello Stato.
- Lodari, R., 2017: *Atlante dei giardini del Piemonte*. Libreria Geografica.
- Regione Piemonte: *Alberi monumentali*. Web site: <https://www.regione.piemonte.it/web/temi/ambiente-territorio/foreste/alberi-arboricoltura/alberi-monumentali#> (last consultation 10.6.2025)
- Ministero dei Beni Culturali e Ambientali, Comitato nazionale per lo studio e la conservazione dei giardini storici, 1991: *Parchi e giardini storici: conoscenza, tutela e valorizzazione*, Leonardo De Luca Editori
- Campanella, R., D'Agostino, A., 2021: *GIS Applications in Cultural Heritage Management*. Springer.
- Cazzato, V., 2016: *Il giardino come opera d'arte: Metodologie di catalogazione*. Gangemi Editore.
- Council of Europe, 2000: *European Landscape Convention*.
- European Commission, 2021: *Next Generation EU: Cultural Heritage and Sustainable Tourism* (https://digitallibrary.cultura.gov.it/wp-content/uploads/2021/11/C_2021_7953_1_EN_ACT_part1_v5_YLDLDJUfeiMyrMtRT5F0sz2MGmc_80911.pdf)
- ICCD, 2018: *Standard cataloguing of historic parks and gardens (PG 4.01)*, https://iccd.cultura.gov.it/it/ricercanormative/249/pg-parchi-e-giardini-4_01
- ICOMOS, 1981: *Florence Charter on Historic Gardens*.

Italian Government, 2021: *National Recovery and Resilience Plan (PNRR)*.

Tortora, A., 2022: *Databases and Open Access in Digital Heritage*. Edited By Lindsay MacDonald, Routledge, Taylor and Francis Group.

Tucci, F., & Rossini, F., 2020. Monitoring and Conservation of Historic Gardens in the Digital Age. *Journal of Cultural Heritage Management*, 14(3), 45-62.

Fairclough, G. et al., 2018: *The Routledge Companion to Landscape Studies*. Routledge.

ICOMOS-IFLA, 2017: *Principles Concerning Rural Landscapes as Heritage*.

Laird, M., 1999: *The Flowering of the Landscape Garden*. University of Pennsylvania Press.

Ripp, M., Rodwell, D., 2015. The Geography of Urban Heritage. *The Historic Environment: Policy & Practice*, 6(3), 240–276.

Sarlöv Herlin, I., 2016: *Exploring the Boundaries of Landscape Architecture*. Routledge, Taylor and Francis Group

Treib, M., 2011: *Meaning in Landscape Architecture and Gardens*. Routledge, Taylor and Francis Group

ICCD, 2022: *Norme di compilazione per il progetto "censimento dei parchi e giardini storici"*
(https://parchiegiardini.cultura.gov.it/wp-content/uploads/2025/03/PG-4.01_Norme-di-compilazione-per-censimento_12mar25.pdf)