Exploring Transformative Potentials of Urban Cemeteries Through an Evolutionary Evaluation Approach: The Case Study of "Poggioreale" in Naples (Italy)

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Abstract. The article analyses theoretical framework and methodological pathways to investigate the potential impacts of transforming cemeteries into multifunctional landscapes that benefit citizens living in urban areas, fostering a paradigm shift in their conceptualisation from "Heterotopia" to "Hypertopia". With recognising of several levels of environmental, health and wellbeing, and cultural services, cemeteries are becoming relevant examples of places which provide citizens with multiple landscape and ecosystem services. This contribution is part of a University of Naples "Federico II" funding project, referred to as "Rethinking lastscapes Perspective", and it aims to investigate people's viewpoints concerning the current state and transformative potentials of Italian cemeteries, with a particular focus on the case study of the "Poggioreale" cemetery system in Naples (Ita-ly). A literature survey has allowed the scientific landscape to be explored relating to urban studies focused on cemeteries. Stated Preference Methods (SPM) and Volunteered Geographic Information (VGI) have been selected as the best-fit methods to be implemented in a preliminary research stage. These qualitative methods were beneficial during earlier phases of evaluations to gather fast feedback, exploration, and pilot testing, from an Evolutionary Evaluation (EE) perspective. Therefore, participants were asked to express their opinions concerning three main topics, considered more consistent with the research purposes: most recurring emotions, potential landscape services, and people's concerns attached to these places. Furthermore, the survey respondents were asked to map the preferred paths during the park visit. The findings are expected to have relevant implications for citizens and policymakers who experience the cemetery as a place supplying multiple potential landscape services.

Keywords: Cemeteries · Multifunctional Landscapes · Evolutionary Evaluation

1 Introduction

Evidence from around the world shows that cemeteries serve purposes beyond their traditional role of burying the dead and commemorating their lives [1]. They also provide cultural and recreational spaces similar to parks [2] and contribute to the vitality and

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health of natural ecosystems for future generations [3], making them similar to green infrastructure, which is a network of natural and semi-natural areas that are strategically planned, designed, and managed to provide a range of environmental, social, and economic benefits to people and wildlife [4, 5].

This contribution is part of a University of Naples "Federico II" funding project referred to as "*Rethinking lastscapes Perspective (R.l.P.)*", and it aims to investigate people's viewpoints concerning the current state and transformative potentials of Italian cemeteries in providing citizens with Landscape Services (LS).

Landscape Services (LS) are the benefits people receive from the land that has been transformed by human activities, i.e.: agriculture, built environment or urbanisation processes [6]. Ecosystem Services (ES) are the benefits that humans receive from ecosystems and have been conceptualised at the foundations of Ecological Economics [7, 8] by expressing the value of natural ecosystems in monetary terms to make Decision-Makers aware of global consequences related to their depletion or lost [9]. The concepts are not interchangeable but should be used according to the contexts and purposes of the studies. LS, indeed, refer to a range of services provided by particular landscape's elements, such as the historical greenery or urban built-up areas with architectural and symbolic value [10–12] which cemeteries offer as places of memory, history, architecture, religion, and collective identity. ES are the benefits that humans receive from nature, such as clean air and water, food production, and climate regulation. On the contrary, LS are often related to the services provided by the landscape, but they extend beyond it to encompass especially the immaterial benefits provided by ecosystems.

Cemeteries can be, thus, conceived as multifunctional landscapes [13] since they integrate nature, culture, history, and social values into spaces which are unique and different from other green urban areas [14].

Inadequate management of cemetery areas can lead not only to problems of maintenance and deterioration of the built heritage but also to the loss of significant ecosystem and landscape services. For this reason, the identification of these services constitutes a fundamental strategy of conservation and valorisation from the perspective of evaluating preferable actions linked to the use of these spaces.

Several frameworks to classify, assess, and map ES and LS have been provided by international expert working groups. Among these, MAES is a framework developed by the European Environment Agency (EEA) to assess the current state of ecosystems and the services they provide for humans [15]. This framework allows for the identification of pressures on ecosystems, their resilience, and the services that ecosystems can provide. Moreover, MAES can help identify the most effective policy measures to ensure the sustainability of interventions by including the mapping and assessment of ecosystems, the classification of their services, and the impact evaluation of programs and planning on their functioning and provisioning. This work helps provide scientific and policy support for the sustainable use and management of landscapes.

The Economics of Ecosystems and Biodiversity (TEEB) represents a further international initiative to draw attention to the global economic benefits of biodiversity, led by Pavan Sukhdev, Special Adviser and Head of UNEP's Green Economy Initiative and Study Leader of TEEB [16]. It evaluates the economic value of biodiversity and ecosystems and how their destruction can hurt the global economy. It also examines how to

best integrate the value of nature into decision-making processes at all levels, from local to global.

However, the initiative most consistent with the proposed research is the Common International Classification of Ecosystem Services (CICES), a standardised framework for categorising and describing the various types of ecosystem services that are provided by nature [17]. It was developed by the European Environment Agency (EEA) in collaboration with other international organisations. CICES provides a common language and set of categories for describing ecosystem services, which can help researchers, policymakers, and stakeholders better understand the value of natural systems and make more informed decisions about how to manage and protect them. The classification system is based on a hierarchical structure that includes three levels of detail: divisions, groups, and classes.

At the highest level, CICES includes three main divisions that encompass all ecosystem services: (i) Provisioning services, those that provide products such as food, water, and timber; (ii) Regulation and Maintenance services, those that help to regulate environmental conditions and support the maintenance of ecosystem integrity such as climate, air and water quality, and disease; (iii) Cultural services, those that provide non-material benefits such as recreational opportunities, cultural heritage, and aesthetic values. Each division is further divided into groups and classes, providing a detailed breakdown of the different types of ecosystem services within each category.

The LS classification proposed by Valles-Planells et al. (2014) follows the CICES framework by integrating new groups of services related to daily activities, regulation of the spatial structure, health, enjoyment, self-fulfilment, and social fulfilment.

In this perspective, the LS concept is esteemed to be consistent with the purposes of this research since it promotes interdisciplinary knowledge, assessment of spatial landscape pattern-functioning relationships at a local scale, collaborative tools for practitioners and policymakers [18].

The presented research aims to examine the transformative potentials of cemeteries using participant documentation, survey, and unstructured observations, and it is framed in the Evolutionary Evaluation (EE) first phase referred to as: “Process and Response”. The transformative potential was conceptualised in terms of the capacity of cemeteries to provide multiple LS for citizens beyond their standard use. The investigation was addressed to explore people’s perceptions related to current conditions, values attached to places, and their possible transformations. The “Poggioreale” cemetery park in Naples (Italy) was selected as a testing area to lay the foundations for the evolution of programs which shape these spaces from “heterotopia” to “hypertopia”[19].

The research questions which motivate this study follow:

- How can Evolutionary Evaluation inform a design process of cemetery spaces to make a paradigmatic change from heterotopia to hypertopia?
- Does the Evolutionary Evaluation provide practitioners and researchers with a best-fit framework to evaluating and planning of transformative scenarios?
- Is it possible to combine Evolutionary Evaluation to Landscape Services, conceived as a boundary object for different disciplines, to explore transformative potentials of urban cemeteries?
- Is there a potential demand of Landscape Services that citizens attach to cemeteries?

– To what extent Landscape Services framework can support Policy-Makers to make a step forward in the management of cemeteries?

The article shows a preliminary investigation of the proposed research questions from the *R.l.P.* project.

The remainder of the paper proceeds as follows: Sect. 2 presents the scientific landscape which links the research issues to the framework of Evolutionary Evaluation (EE); Sect. 3 shows material and methods implemented for the case study of the "Poggioreale" cemeterial system in Naples (Italy); Sect. 4 shows the preliminary results and expands on their implications in the future steps of the research; Sect. 5 concludes the article with limitations and potentials of the proposed approach.

2 The Scientific Landscape

An exploration of the scientific literature relating the studies on Evolutionary Evaluation, Landscape and Ecosystem Services, and cemeteries was performed by means of the software provided by van Eck and Waltman (Eck & Waltman, 2019) and referred to as *vosViewer*, which made it possible to analyse and display an emerging scientific landscape consisting of more than 500 articles.

The search has been led on *Scopus* indexing database, selecting open-access publications in the range 1993–2023. The keywords entered and related logical operators were: ("cemetery" OR "cemeteries" OR "burial sites" OR "memorial park" OR "funerary grounds" OR "graveyard") AND ("landscape services" OR "ecosystem services" OR "integrated assessment" OR "assessment" OR "evaluation" OR "evolutionary evaluation" OR "sustainable design" OR "sustainable planning"). The fields relevant to the research issues have been selected within the categories related to Social Sciences, Arts and Humanities, Environmental Science, Agricultural and Biological Sciences, Engineering, and Energy.

The overall number was reduced to 108 articles, combined from the titles, keywords and abstracts. The most recurring terms are listed in the ranking head: 1. Area (375); 2. Age (229); 3. Burial (226); 4. Population (223); 5. Risk (149); 6. City (147); 7. Burial site (145); 8. Value (127); 9. Soil (120).

The network visualisation in Fig. 1 shows the three clusters of topics which have been detected from database search (Fig. 1): Cluster 1 (blue colour) – Cemeteries have been analysed from a socio-cultural perspective, through surveys on the historical and artistic heritage and investigations on the remains found in the tombs; Cluster 2 (cyan colour) – Cemeteries have been studied from the perspective of risk, especially health risk associated with soils and burial sites; Cluster 3 (green colour) – Cemeteries have been analysed from a regional and urban perspective, highlighting their contribution to the natural ecosystem.

The proximity of two items in the visualisation approximates their relatedness in terms of co-citation links. By selecting the most frequently cited keywords and concepts, it has been feasible to collect and examine literature that is oriented towards specific goals in recent years. The weight of clusters denotes the number of occurrences of the term in the scientific literature. In the period analysed, the articles reporting themes from cluster 1 have been mostly stressed in the United States and Germany. Starting from 2010, the

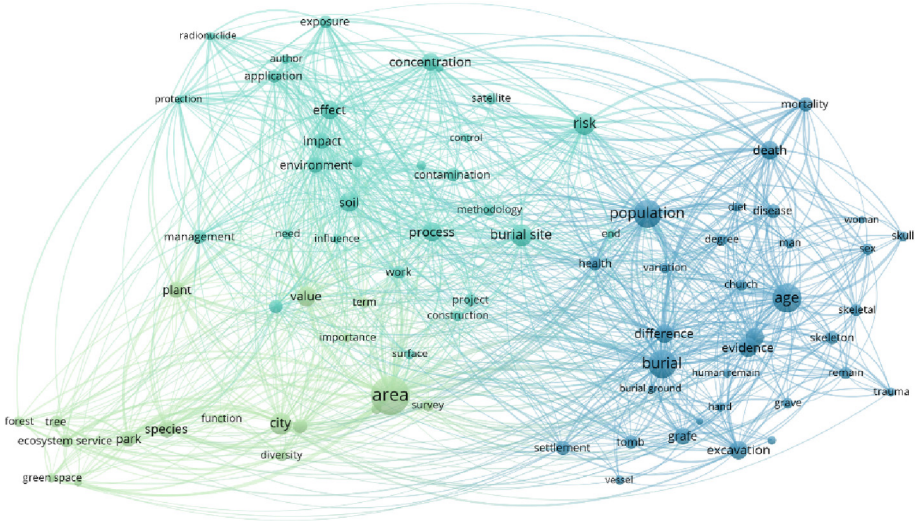

Fig. 1. Graph of the most recurring terms in scientific publications from *Scopus* database in the range 1995–2023.

themes of cluster 2 have been increased and deepened, while research relating to cluster 3 has only increased in the last 5 years, including Italy, Poland, Russia, Canada, and France.

The literature study focus has been shifting towards urban studies in which the spatial dimension has highlighted new research trends underlining the importance of cemeteries as places which provide citizens with ecosystem services, combining "city studies", "plant and biodiversity", "forest and green areas" within the Cluster 3. The development of cities in terms of urbanisation has determined the progressive approach of inhabited centre's boundaries to cemetery areas, that were historically peripheral, and, thus, the need to investigate environmental risks (Cluster 2) and the new role of these areas has emerged in a holistic dimension and multidimensionality of the contemporary city. The scientific landscape has been clearly showing that cemetery areas must be investigated from an interdisciplinary perspective integrating different assessment methodologies to inform programs, projects, and the management of these complex sites. These studies include the socio-cultural and anthropological dimension [20], environmental justice [21, 22], risk assessment [23], and ecosystems and cultural biodiversity [24–26].

Regarding the most common survey-based methods for assessing LS/ES - and, in general, various urban dynamics - the authors have detected the following four categories from the analysis of the scientific landscape: Stated Preference Method (SPM); Contingent Valuation Method (CVM); Choice Experiment Method (CEM); and Citizens Science approaches.

Stated Preference Methods are a type of survey-based research technique that seeks to understand how people value goods, services, or other attributes. These methods involve asking individuals to express their preferences for hypothetical scenarios or choices.

Contingent Valuation Method (CVM): CVM is a survey-based approach that asks people how much they would be willing to pay for a good or service or how much they would accept as compensation for a negative outcome, such as environmental damage. CVM can be used to estimate the monetary value that people place on non-market goods, such as clean air or scenic views.

Choice Experiment Method (CE): CE is a survey-based approach that presents individuals with a series of hypothetical choices between alternatives with different combinations of attributes. By analysing the choices made by participants, researchers can estimate the relative importance of each attribute and the trade-offs people are willing to make between them [27].

Both CVM and CE are widely used in environmental economics and health economics to estimate the economic value of public goods and services.

Citizen Science involves volunteers in scientific research by collecting data and contributing observations [28]. In the context of geographic mapping, citizen science projects can involve volunteers collecting data on environmental features, wildlife habitats, social concerns, feelings, or other aspects of the landscape.

Crowdsourced geographical mapping methods are techniques that involve using volunteers or the general public to collect and contribute geographic data to digital maps. These methods rely on a distributed network of individuals who use mobile devices, GPS units, or other tools to collect, validate, and edit geographic information. Some of the common crowdsourced geographical mapping methods and tools are:

OpenStreetMap (OSM): OSM is a collaborative project that aims to create a free, editable map of the world. Volunteers can contribute data by mapping roads, buildings, points of interest, and other features using OSM's web-based editing tools or mobile applications.

Participatory GIS (PGIS): PGIS is a collaborative approach that involves stakeholders in the process of mapping and analysing geographic data. This approach can be used to support community-based planning and decision-making by giving residents a voice in how geographic data is collected and used [29–31].

Crowdsourced geographical mapping methods have become increasingly popular in recent years due to the widespread availability of mobile devices and the growth of online communities. These methods can be used to create detailed, up-to-date maps of areas that are not well-served by traditional mapping methods, such as remote or underdeveloped regions. However, these methods also present challenges, such as ensuring data quality, addressing privacy concerns, and managing conflicts among contributors.

2.1 The Evolutionary Evaluation (EE) Approach to Assessing LS Cemetery Parks

The Evolutionary Evaluation (EE) concept is a framework for evaluating and assessing the effectiveness of social interventions or programs over time. It is based on the idea that social interventions and programs are complex adaptive systems that are constantly evolving and changing in response to their environment and that the evaluation of these interventions needs to be dynamic and flexible to capture these changes [32]. This concept is concerned with understanding the long-term impact of transformative interventions and programs, as well as how they adapt and evolve over time. It recognizes that planning

is often subject to external factors such as changes in policy, funding, and community attitudes, which can impact their effectiveness [33].

The key principles of EE fit with the purpose of this research which is to investigate cemetery visitors' perceptions and needs to provide new design strategies which spark the landscape and ecosystem potential linked to these places.

The EE approach, indeed, gets an emphasis on adaptation and learning processes since evaluators must be open to adapting their evaluation approach in response to changes in the program or intervention being evaluated. Furthermore, the EE promotes collaboration and partnership between evaluators and program stakeholders to ensure that the evaluation is relevant and useful. In addition, the evaluation should consider the multiple variables that influence program success or failure, including social, economic, and environmental factors. In this perspective, the operational frameworks of LS and ES could inform planning and evaluation processes by implementing indicator-based methods to identify, categorise, and assess cemetery potentials to provide multiple benefits for citizens.

The use of the above-mentioned mixed and iterative assessment methods aids in capturing the complexity of the afforded issues and in gathering regular feedback and learning cycles which constantly inform program adaptation and improvement. The commonly used evaluation methods to assess ES and LS can be implemented to categorise and rank the cemeteries according to their capacity in providing services for citizens in an urban context. In the surveyed scientific literature, the most recurring methods to assess ES and LS can be grouped and listed as follows:

1. Economic valuation methods. They involve placing a monetary value on the ecosystem services, usually through methods such as cost-benefit analysis, contingent valuation, revealed preference, travel cost [34], hedonic price models [35], and real estate market changes [36].
2. Qualitative methods. They are used to assess the value of ecosystem services that cannot be quantified in monetary terms, through interviews and surveys, focus groups, and other qualitative approaches [37]
3. Biophysical methods. These methods measure the physical quantities of ecosystem services. Examples include remote sensing and field-based measurements of primary production, wildlife population surveys, water quality monitoring, and urban wetlands [38].
4. Modelling approaches. These methods involve the use of computer models to simulate the flow of ecosystem services over time, based on data from multiple sources. Examples include ecosystem services models, landscape models, and ecological surveys [39] which use Geographic Information Systems (GIS) for spatial analysis and data visualisation.

The authors have implemented qualitative methods as a starting point for their research on the transformative potentials of cemeteries in the urban context of Naples (Italy). Overall, the EE concept provides a framework for evaluating new design strategies for cemeteries that acknowledge their complexity and the need for a flexible,

dynamic approach to evaluation. Figure 2 show the main steps of EE - as proposed by Urban et al. (2014) - which relate programs to evaluation, as follows:

– "Process and Response" relates to "Initiation"
– "Change" relates to "Development phase"
– "Comparison and control" relates to "Stability"
– "Generalizability" relates to "Dissemination"

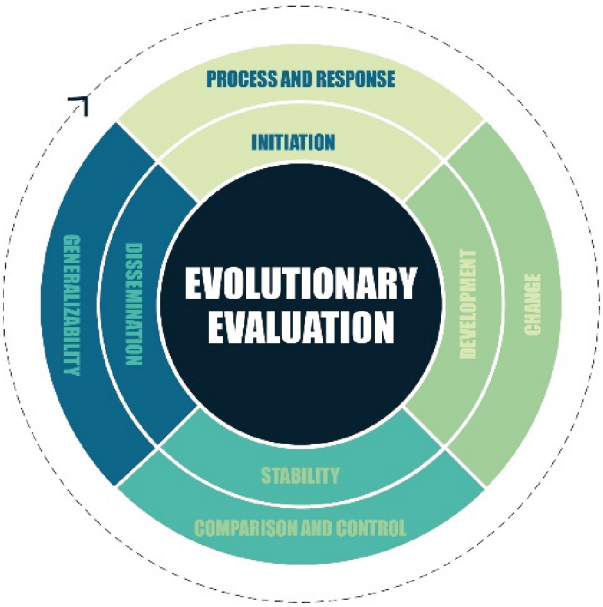

Fig. 2. Evolutionary Evaluation phases.

This contribution aims to show the first step of EE referred to as "Process and Response" by which the preliminary findings of people's feelings and perceptions about cemetery spaces have been investigated.

3 Materials and Methods

The proposed methodology aims to provide Decision-Makers with a framework to make a step forward in the valorisation and management of cemeteries by recognising the LS that these places can supply to citizens. As part of the above-mentioned *R.l.P.* interdisciplinary research, the contribution aims to show the results obtained from two qualitative methods, namely the Stated Preference (SP) method and Volunteered Geographic Information (VGI), implemented through a georeferenced survey for cemetery visitors. In particular, the methodological workflow in Fig. 3 shows the preliminary phase of the research which has been related to the first step of the EE framework (Fig. 3).

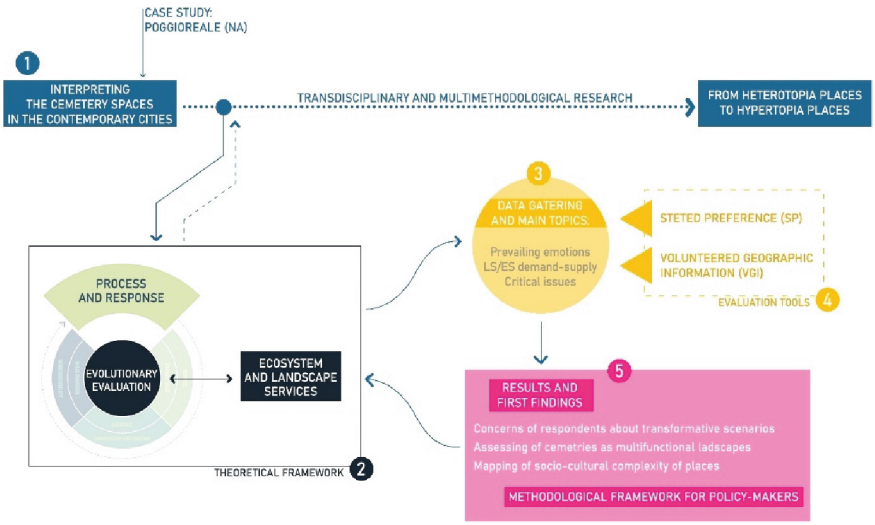

Fig. 3. Methodological workflow.

The methodological steps are as follows:

- Step 1. Problem definition and research purpose. Starting from the main goal of R.l.P. project, which aims to trigger cemeteries transformation from Heterotopia to Hypertopia, the problem statement related to this contribution has been defined in terms of suggesting management models which include LS and ES. In this step, the case study of Naples cemeterial system of "Poggioreale" (Italy) has been selected as a testing area;
- Step 2. Theoretical framework. Three theoretical frameworks and evaluation approaches have been selected for this research: the Evolutionary Evaluation, Landscape Services, and Ecosystem Services.
- Step 3. Data gatering and main topics. The primary topics to be explored have been established as: prevailing emotions linked to cemeteries, demand and supply of landscape and ecosystem services, and critical issues and visitor's concerns.
- Step 4. Evaluation tools. Two qualitative methods were esteemed to be useful to obtain results: Steted Preference (SP) method and Volunteered Geographic Information (VGI).
- Step 5. Results and first findings. The preliminary results from SP and VGI were provided to expand the goal and address the future research steps.

Next Sections show the case study and results from the methodology Step 4.

3.1 The Case Study

The burial sites laying on the "Poggioreale" hill in Naples (Fig. 4) structure a complex urban system. Starting from the ancient city centre toward north-east, coherently with a process of expulsion of burial sites from the city of the living since 1763, 11 cemeteries have transformed the hill.

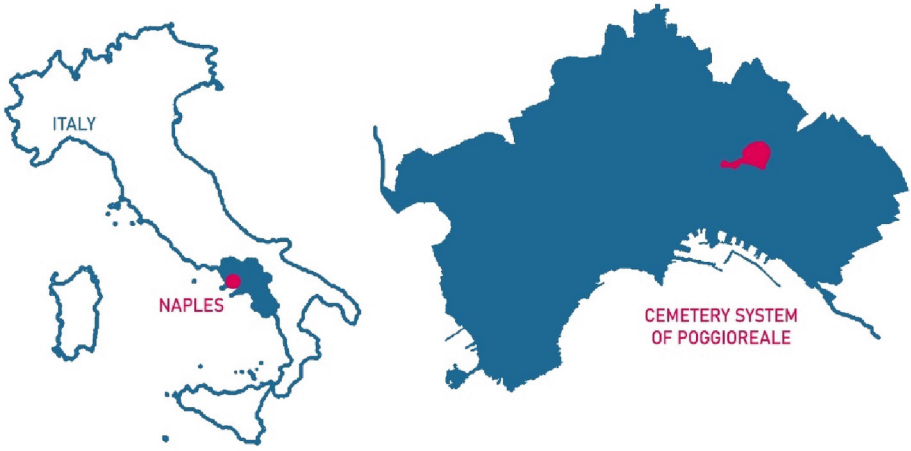

Fig. 4. Location of the "Poggioreale" cemetery in Naples (Italy).

Following the extraordinary "Cimitero delle 366 fosse" by Ferdinando Fuga, the east-side of Naples has been enriched of many different burial sites conceived for different religions, for diverse economic status, and as a response for health crises. Beyond this, the 11 enclosed citadels dedicated to the dead establish different relationships with the surrounding neighbourhood and with both the landscape of the hill and the landscape that from the hill can be perceived: the Neapolitan Bay. Moreover, the "Poggioreale" cemeteries system bear witness to different historical phases through many design approaches that have originated the 11 enclosed cities of the dead. Nowadays, the whole complex system of cemeteries is framed by the urban expansions traceable back to the last century. This urban area is made of walls enclosing mono-functional architectures generating a deep marginalisation in terms of public space, green areas, and, more generally, cultural infrastructures. This urban sector of the city could benefit from the cemeteries system if this would be reconsidered. In this direction, a first step could be the insertion of the foreseeable "Poggioreale" park within the protected area referred to as "Parco delle Colline Metropolitane" in Naples [40]. Such an envisaged political shift could be an operative way to experiment the theoretical shift from Heterotopia to Hypertopia.

4 Results

Within the R.l.P. project, the SPM was operationalised through on-field multiple-choice survey for the "Poggioreale" cemetery visitors and users. Interviewers were asked to express their opinions concerning three main topics, considered more consistent with the research purposes: most recurring emotions, potential landscape services, and problematics concerned with shaping cemeteries into multifunctional parks. Furthermore, the survey respondents were asked to map the preferred paths during the visit.

Next Sects. 4.1 and 4.2 show the preliminary results from SPM and VGI.

4.1 Stated Preference Method: Most Recurring Emotions, Potential Landscape Services, and Respondents 'Opinions

As show in Fig. 5, the sample of responding users is mostly over 55 years old, while less than 20% of respondents are under 25 years old. The respondents are 86% Neapolitan.

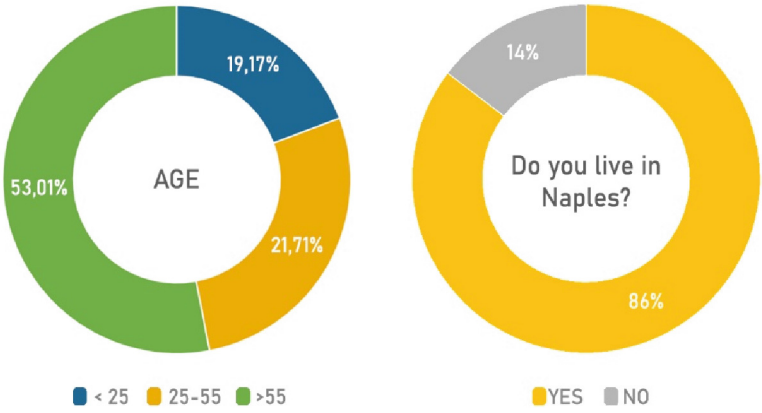

Fig. 5. Age and residency of respondents.

Subsequently, the mode of travel was investigated, highlighting how the majority of citizens find it easier and more convenient to reach the cemetery with their own private vehicle (Fig. 6).

Regarding the uses of the cemetery area, a particularly significant data is reported in Fig. 7, which shows that more than 60% of users visits cemetery solely to visit the graves of their relatives, highlighting the traditional prevailing use. Furthermore, only 20% of the sample identified green areas as relevant services, while the most recurring response was related to the need for basic utilities, e.g., benches and seats and internal mobility services.

In relation to the development scenario of a multifunctional park, respondents were asked if they believed it was possible to imagine a more open cemetery and to motivate their response. As show in Fig. 8, the collected answers were divided into three groups corresponding to three possible scenarios deduced from the collective imagination. Indeed, 59.76% believe that the cemetery should remain closed, only improving the services connected to the cemetery function. The 40.24% of the sample show a greater inclination towards negotiating the cemetery space, and it is distributed as follows: 17.07% propose to implement spaces for relaxation and existing services, also in the logic of an urban park; while 23.17% foster a more open vision of the cemetery, also implementing existing functions (such as play areas for children, refreshment areas, etc.), always emphasizing the need to think in terms of compatible uses. Indeed, over 80% of respondents are concerned that a more open and multifunctional cemetery scenario may desecrate the place and disturb funeral rituals, increasing the risk of profanation of graves.

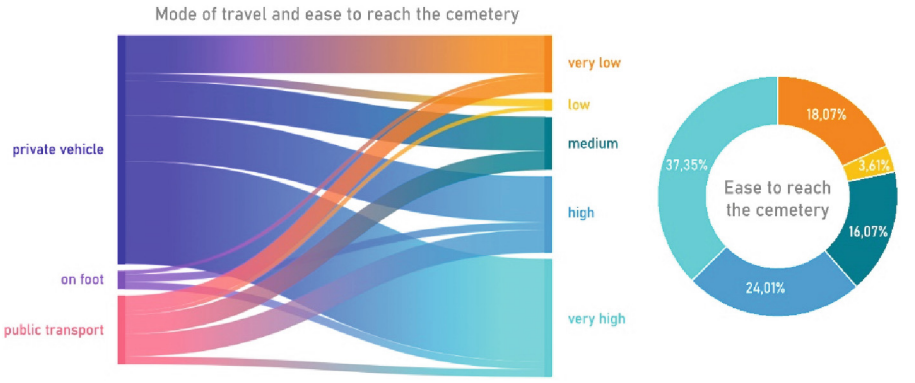

Fig. 6. Mode of travel and ease to reach the cemetery.

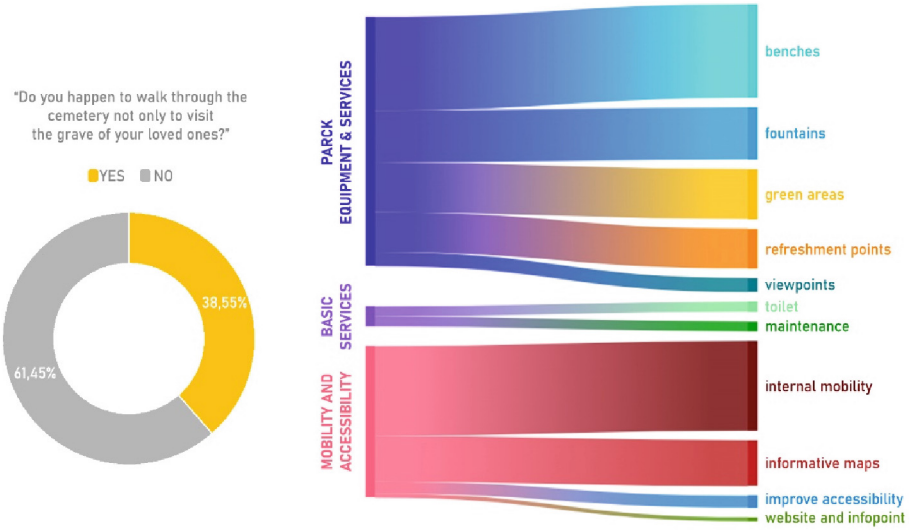

Fig. 7. Services most frequently perceived as essential by respondents.

An overview of gathered responses showed that the prevailing emotions linked to the place remain melancholy and sadness. Many people highlight feelings of peace and serenity associated with cemetery spaces. Often, the anger emotion is mentioned, which is linked to the lack of services or poor maintenance of some areas of the cemetery (Fig. 9).

The preliminary results highlighted the need to investigate the cultural issues underlying the cemetery collective consciousness to build a methodological tool to assess new design perspectives generating outcomes exportable in different contexts.

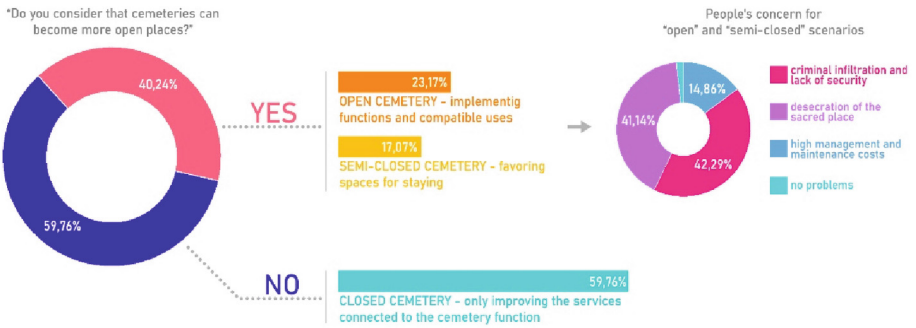

Fig. 8. Three scenarios for urban cemetery and people's concerns.

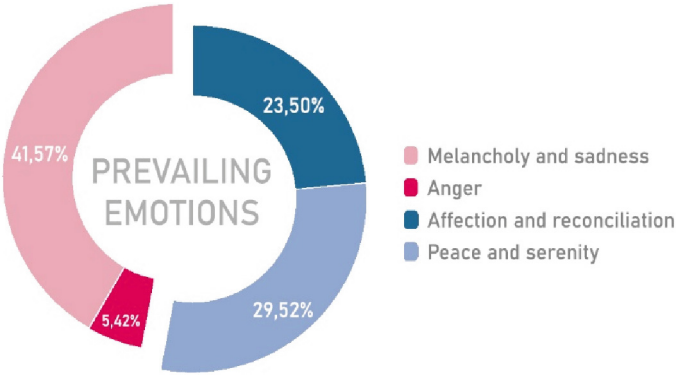

Fig. 9. Prevailing emotions attached to the cemetery by respondents.

4.2 Volunteered Geographic Information

On-field interviews have been conducted using a mobile digital support, and respondents were asked to mark on the cemetery map some particularly significant points and the main paths taken. The collected data was processed with the software Q-GIS into an heatmap of the most frequent markers (Fig. 10).

This allowed the visualization of areas with a higher number of signals due to the presence of famous persons tombs, viewpoints, or monuments. The most frequented paths correspond to the main internal roads of the cemetery, confirming that it is mainly used to reach the graves.

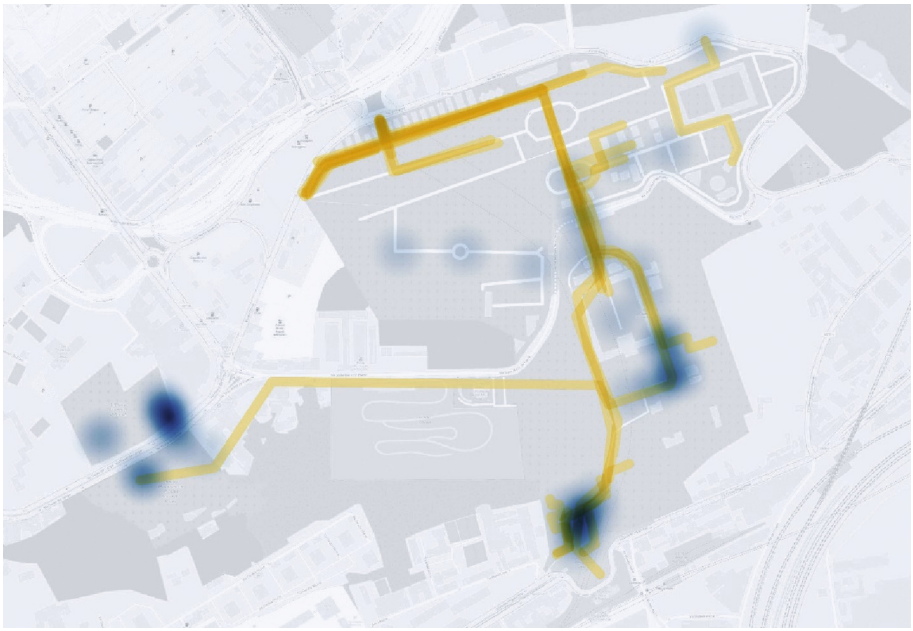

Fig. 10. Crowdsourced map of most recurring paths and points of interests sketched by respondents.

5 Conclusions

The results achieved in this preliminary phase of the wider *R.I.P.* project, implementing the EE approach, provide a general theoretical framework capable of organising guidelines from experts of different disciplines and the demands from citizens to support policymakers in the development of the design process for cemetery spaces from Heterotopia to Hypertopia. This approach, combined with the concepts of LS and ES, has allowed the construction of a methodological proposal capable of investigating the current conditions and guiding the construction of transformative scenarios for cemeteries.

The implemented methodology has indeed demonstrated that there is a real demand for landscape services from citizens. The collected data were useful in understanding the main social and cultural issues related to cemetery spaces and how cemeteries are used in Naples today. Furthermore, they clearly highlight how the different transformative hypotheses and proposed scenarios need to be informed by a wider multidimensional and transdisciplinary process of evaluation and investigation of the transformative potential of urban cemeteries. In conclusion, LS identification and mapping can be suitable approaches to manage recreational landscape that offers cemetery visitors a place to reflect, learn, and appreciate nature.

The findings of this study are expected to have relevant implications for citizens and policymakers who experience cemeteries as potential areas of multiple landscape services provision. Limitations include the small sample size and the use of self-reported

measures. Nonetheless, qualitative methods implemented in this research were particularly useful during earlier phases of evaluations to gather fast feedback, exploration, and pilot testing, in an Evolutionary Evaluation perspective.

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