

FROM CEMETERIES TO ECOLOGICAL MEMORIAL LANDSCAPES: THE RISE OF GREEN AND CONSERVATION BURIAL GROUNDS AND ITS OPPORTUNITIES FOR URBAN PLANNING

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ABSTRACT

The article conducts an interpretative review of contemporary scientific literature (2000–2026) to analyse the environmental aspects of conventional funeral practices and introduces sustainable burial cemetery models such as green cemetery and conservation burial grounds. The interdisciplinary literature review covers landscape architecture, urban planning, urban ecology, environmental sciences, and sustainable development research. The ecological memorial landscapes, which promote human biomass “return” back into biological cycles, could create ecosystems that merge into urban green infrastructure networks, and transform the end-of-life into an active mechanism for environmental preservation. City planners and landscape architects are uniquely positioned to promote this sustainable model by reimagining and zoning cemeteries as urban green infrastructure. This study suggests that despite legal, religious, and cultural barriers, the rise of eco burial practices signals a generational evolution and shift toward ecological accountability and “death positivity” movement.

Keywords: urban green infrastructure, funeral sustainability, green burial, cemetery landscapes, cemetery ecosystem services

INTRODUCTION

For centuries, cemeteries have been an integral part of the cultural and urban landscape of cities (Francis, 2003). Cemeteries served not only as places of burial and remembrance but also as reflections of the dominant social, religious, and aesthetic values characteristic of historical eras (Rugg, 2000; Säumel et al., 2023).

In Europe and the United States, the modern cemetery model developed particularly rapidly during the 18th and 19th centuries, when sanitary, hygienic, and urban planning issues began to play a key role in urban spatial planning. As a result, cemeteries were gradually moved outside compact urban centres and treated as specialised infrastructural spaces related to sanitary control and urban organisation (Sallay et al., 2023; Jaszczak et al., 2026).

However, contemporary social, environmental, and cultural changes have led to a critical reevaluation of the traditional model of funeral spaces. In recent decades, there has been a growing interest in the impact of funeral practices on the natural environment, particularly in the context of climate change, soil degradation, pressure on natural resources, and advancing urbanisation (Keijzer, 2017; Pawlett et al., 2024), as well

as space limitations. Conventional burial practices, among other things, embalming, the use of concrete tombs, metal structural elements, and intensively maintained cemetery landscapes, are associated with significant consumption of materials and energy, as well as emissions of substances that are potentially harmful to the environment (Ibrahim et al., 2023; Neckel et al., 2023).

Rising public ecological awareness is altering the perception of the relationship between death, landscape, and nature. Scholars emphasise the need to design more sustainable forms of memorialisation that minimise environmental pressure while integrating ecological, social, and cultural functions (Clayden et al., 2018; Slominski, 2023). In response to these processes, the green and conservational burial movements have emerged, promoting human body burial based on biodegradable materials, minimised technical infrastructure, and the preservation of landscape and biodiversity (Coutts et al., 2018; Pawlett et al., 2024).

At the same time, perceptions of cemeteries are also evolving. Research indicates that cemeteries can serve as important components of urban green infrastructure and ecological systems that support biodiversity, water retention, habitat conservation, and the provision of ecosystem services (McClymont & Sinnett, 2021; Säumel et al., 2023). Cemeteries are no longer viewed solely as “cities of the dead”, but are interpreted as multifunctional memorial landscapes that integrate remembrance, ecology, recreation, and nature conservation (Fischer, 2025).

Conservation burial, also referred to as a conservation cemetery or memorial forest (Itescu & Jeschke, 2024), takes on a particular significance in this context. This model combines the function of burial with the long-term protection of areas of natural value, landscape restoration, and initiatives led by land trust organisations (Webster, 2023). Unlike traditional cemeteries, conservation burial focuses not only on the burial process itself but also on the protection and restoration of ecosystems and the preservation of the landscape’s biological continuity (Coutts et al., 2018).

Despite growing interest in the concepts of green burial, conservation burial, and ecological memorial landscapes in existing research, the topic of the future ecological functions of cemeteries remains relatively underrepresented in the literature on landscape architecture and urban planning. Ongoing urbanisation and environmental pressures are increasing the importance of integrating memorial functions with nature conservation and sustainable urban land use management.

The aim of this review is to present the contemporary transformation of funeral spaces towards more ecological and sustainable memorial landscapes. The study provides insights into the green and conservational burial practices as alternatives to conventional funeral practices, with particular emphasis on their significance for landscape shaping, biodiversity conservation, and the development of multifunctional ecological spaces. The focus is also on the environmental risks associated with traditional forms of burial and the growing role of cemeteries as elements of urban green infrastructure. The presented literature review intends to show that green and conservational burial practices can positively influence spatial planning.

METHODOLOGY

The research method of this article is a scientific literature review, and it was developed on the basis of a qualitative and interpretive analysis of contemporary scientific literature (Scopus, Web of Science, ResearchGate) on green burial, conservation burial, cemetery ecology, and memorial landscapes. The analysis included publications representing interdisciplinary research areas covering landscape architecture, urban planning, urban ecology, environmental sciences, funeral studies, and sustainable development research. The source material included scientific peer-reviewed articles, review papers, monograph chapters, reports, and conceptual designs published primarily between 2000 and 2026.

The literature review focused primarily on:

1. The ecological and social functions of cemeteries within the framework of urban green infrastructure.

2. The development of green burial and conservation burial as alternative models of memorialisation.
3. Multifunctional landscape planning in relation to cemetery spaces.
4. Contemporary cultural shifts regarding the perception of death and funeral spaces.

The study aimed at identifying the main trends in the contemporary, eco-approached transformation of funeral landscapes and the potential significance of these concepts for landscape architecture and urban planning.

GREEN BURIAL AS AN ELEMENT OF THE TRANSFORMATION OF CONTEMPORARY MEMORIAL LANDSCAPES

The modern funeral industry is becoming the subject of discussions regarding sustainable development, environmental impact, and the future use of memorial spaces (Yu, 2024). Traditional funeral practices, including embalming, use of concrete tombs, and intensively maintained park cemeteries, are associated with significant consumption of raw materials and emissions of substances that are potentially harmful to the environment (Keijzer, 2017; Pawlett et al., 2024). According to Pawlett et al. (2024), the modern model of burial generates numerous environmental risks, related, among other things, to the use of formaldehyde, treated wood, metals, and sealing materials, which can leach into the soil and groundwater.

In the United States, millions of gallons of formaldehyde used in embalming enter the environment each year, along with significant amounts of wood, steel, and concrete used in the construction of coffins and tombs (Nosi et al., 2024; Pawlett et al., 2024). Nosi et al. (2024) suggest that the funeral industry is among the sectors that generate significant environmental impacts, including greenhouse gas emissions, soil degradation, and pressure on natural resources. The authors also point out that the growing number of deaths in aging societies further increases the importance of more sustainable methods for handling human remains.

Recent decades have witnessed the rise of the green burial (also known as the natural burial) movement, which intends to mitigate the negative environmental impacts of funeral practices while preserving the cultural and symbolic meaning of interment (Clayden et al., 2018; Coutts et al., 2018; Shelvock et al., 2022). Green burial entails the complete rejection of toxic chemical preservatives, a restriction on the use of non-biodegradable materials, and a more organic integration of the burial process into ecosystem functions (Stock & Dennis, 2023; Pawlett et al., 2024).

The core tenet of a natural burial is to facilitate natural decomposition within the soil matrix (Green Burial Council [GBC], 2021). Bodies are buried without embalming fluids, concrete vaults, or heavy, non-biodegradable infrastructural components (Yarwood et al., 2015; Coutts et al., 2018). This practice dictates the use of caskets or shrouds made of natural fibres, placed directly into the earth at a depth of approximately 1.2 m (shallower than the 1.5-meter depth of a conventional grave), which optimises oxygen circulation and tissue breakdown. The prohibition of synthetic materials extends to the grave markings and adornments. Instead of classical granite tombstones, memorialisation methods utilise features borrowed from the natural environment, such as indigenous rocks or living trees (Clayden et al., 2018).

The green burial movement also reflects shifts in the social perception of mortality and voices a clear critique of the commercialisation of the modern death care industry. Shelvock et al. (2022) point out that the dominant Western funeral model has been heavily subjugated to economic logic, transforming death into a multi-billion-dollar service sector. The authors point out that alternative ecological practices represent an attempt to reclaim a more reflective, less consumption-driven approach to death and humanity's relationship with nature. Similar observations are presented by Slominski (2023), who interprets the growth

of eco-funerals as part of a broad transformation of social practices surrounding mortality, environmentalism, and ecological accountability.

An important element of this movement is a reevaluation of cemetery spatial design. Traditional cemeteries are typically characterised by manicured lawns, high water consumption, and low ecological value (Jaszczak et al., 2026). Conversely, natural burial grounds are frequently designed as complex landscapes consisting of native vegetation, woodlands, meadows, or restored ecosystems (Clayden et al., 2018; Fig. 1). According to Coutts et al. (2018), natural burial can serve as an effective tool for landscape conservation and green space preservation, particularly in areas threatened by urban sprawl.



Fig. 1. Examples of green burial grounds landscaping that favours native vegetation. The Upper Meadow (left) and the Ancestors Forest (right), located within Fernwood Cemetery, Mill Valley, California

Source: photos by Katarzyna Krzykawska Apolinarski, 2025.

Literature frequently underlines the value of a natural burial in sustaining ecosystem services. Pawlett et al. (2024) indicate that natural burial sites can bolster biodiversity, stormwater retention, and the development of more stable soil ecosystems, though the authors simultaneously caution that many facets of these sites' environmental footprints require further investigation. Specifically, questions remain regarding the long-term impact of decomposition byproducts on soils and local aquifers, as well as greenhouse gas emissions produced during decomposition (Keijzer, 2017; Pawlett et al., 2024).

Despite the growing popularity of green burials, these practices remain relatively niche compared to the conventional funeral industry. Among other factors, their growth is limited by legal, cultural, and religious constraints, as well as the public's attachment to traditional forms of memorialisation (Slominski, 2023; Yu, 2024). At the same time, new generations of consumers are gaining increased importance, as they more frequently express interest in practices aligned with environmental values, minimalism, and responsible consumption (Nosi et al., 2024).

In recent years, green burial has come to be viewed not just as an alternative funeral method, but as part of a broader transformation of memorial landscapes and spatial usage paradigms. Burial grounds are ceasing to function solely as “cities of the dead”; instead, they are treated as multifunctional ecological landscapes that integrate memory, habitat preservation, and passive recreation (Yarwood et al., 2015; Clayden et al., 2018).

Cemeteries within the structure of urban green infrastructure

In many cities, cemeteries comprise some of the largest and most stable and valuable urban green spaces. Consequently, they should not be viewed solely as spaces for burial and remembrance, but as vital components of urban ecological and landscape systems (McClymont & Sinnett, 2021; Säumel et al., 2023). In the context of advancing urbanisation, habitat fragmentation, and the reduction of green spaces, cemeteries are becoming important components of urban green infrastructure, serving both ecological and social functions (Długoński et al., 2022).

Due to cemeteries' spatial permanence, limited development intensity, and significant proportion of tall vegetation, they can serve as a refuge for numerous plant and animal species (Löki et al., 2019; Itescu & Jeschke, 2024). Löki et al. (2019), in their analysis of 97 studies from five continents, indicated that cemeteries and church burial grounds can play a significant protective role for rare and endangered species, particularly in landscapes heavily altered by human activity. The authors emphasise that the long-term continuity of these sites and their relatively low level of disturbance contribute to the preservation of valuable habitats and high biodiversity. Itescu and Jeschke (2024) concluded that cemeteries often feature a high proportion of native plant and animal species and can value of cemeteries can be comparable to that of other urban green spaces, including city parks. For instance, Villaseñor and Escobar (2019) demonstrated that park cemeteries can serve as important habitats for native bird species, particularly when surrounded by other green spaces and characterised by high vegetation cover. Old cemeteries with mature trees and limited maintenance intensity are particularly significant (Straka et al., 2022).

Latest literature also highlights the importance of cemeteries for the provision of ecosystem services. Andersson et al. (2007) note that less intensive, diversified management approaches can enhance the resilience of urban ecosystems and foster their adaptive capacities. Sallay et al. (2023) indicate that urban cemeteries can perform regulatory, supportive, and cultural functions, including mitigating the urban heat island effect, improving air quality, water retention, protecting soil, and providing recreational and contemplative spaces. Similar conclusions are presented by McClymont and Sinnett (2021) and Długożima et al. (2020, 2024).

Increasing importance is also being attributed to the cultural and landscape dimensions of cemeteries (Jaszczak et al., 2026). Długoński et al. (2022) point out that cemeteries are sites of high biocultural value, combining sacred, historical, social, and ecological functions. Similarly, Menchetelli and Dottorini (2025) interpret the cemetery landscape as a complex liminal space that integrates memory, architecture, and symbolic meanings related to the relationship between humans and nature.

The recreational and social potential of cemeteries is also underscored. Sallay et al. (2022) point out that cemeteries can serve as walking areas, places of rest, and components of urban recreational infrastructure, particularly in densely built-up urban areas with limited access to green spaces. Długożima et al. (2026) suggest that cemetery can even serve for leisure purpose. At the same time, the authors note that developing these functions requires striking a balance between the memorial nature of cemeteries and growing public expectations regarding access to green spaces.

The contemporary approach to cemetery planning is based on the concept of multifunctional landscapes, according to which memorial spaces should integrate ecological, social, cultural, and landscape functions (Säumel et al., 2023; Jaszczak et al., 2026). Cemeteries are thus becoming not only places of remembrance but also elements of resilient urban landscapes, supporting cities' adaptation to climate change and improving residents' quality of life.

Environmental risks associated with conventional burial

Despite growing interest in ecological interment methods, traditional cemeteries remain the dominant model for disposing of human remains globally. Conventional practices customarily labelled as “traditional”, even though they were adopted into widespread use no more than half a century ago in many regions, involve

chemical embalming (e.g. with formaldehyde), use of chemically treated lumber, metals, and sealants in the casket manufacture, construction of underground concrete vaults, and surface stone monuments that cover a partial or full burial plot.

Many studies indicate that conventional funeral practices can create a significant impact on the environment, particularly regarding soil quality, groundwater, and public health (Afangideh & Udokpoh, 2022; Gonçalves et al., 2023; Ibrahim et al., 2023). A natural decomposition of the human body releases significant volumes of organic and inorganic compounds, frequently termed “necro leachate” or “cemetery leachate”. This effluent can contain compounds of nitrogen, phosphorus, chlorine, formaldehyde, methanol, pharmaceuticals, microplastics, heavy metals, and numerous pathogenic microorganisms. Gonçalves et al. (2023) indicate that an average human body weighing approximately 70 kg can generate up to 40 l of leachate during decomposition.

Another pressing environmental concern is the application of chemicals during embalming. Ibrahim et al. (2023) emphasise that formaldehyde, a primary component of embalming fluids, is a known carcinogen that poses health hazards to both death care workers and the surrounding environment.

The physical components used for conventional body burial are themselves massive sources of pollution. Caskets, metallic hardware, varnishes, sealants, preservatives, and funeral accoutrements lead to the accumulation of heavy metals in cemetery soils. Furthermore, maintaining traditional cemeteries populated with concrete and stone monuments involves chemical cleaners and stone preservatives, along with intense vegetation control around tombstones, often utilising synthetic chemical pesticides. The most severe hazard is the risk of these combined substances leaching into the surrounding soil and groundwater tables.

Ojo et al. (2022) demonstrated that improperly sited cemeteries, particularly in areas with high soil permeability and shallow water tables, can lead to a migration of contaminants beyond cemetery boundaries. The authors punctuate that this environmental risk depends heavily on soil type, the thickness of the vadose (aeration) zone, moisture levels dependent on a local climate and burial density. Corresponding conclusions are presented by Gonçalves et al. (2023), who indicate that areas with high hydraulic conductivity and shallow water tables display an exceptionally high vulnerability to contamination. Empirical studies conducted in Nigeria, Brazil and Ecuador have confirmed the presence of numerous chemical and microbiological contaminants in water resources near cemeteries (Afangideh & Udokpoh, 2022; Ponce Arguello et al., 2024). Ezenwa et al. (2023) detected elevated concentrations of heavy metals, including nickel and lead, along with generally degraded groundwater quality adjacent to studied cemeteries in Benin City. The authors also mention potential long-term public health risks associated with the consumption of such contaminated water.

However, research also points to deficiencies in legal regulations regarding cemetery locations and their operations. Ojo et al. (2022) observe that in many developing nations, cemeteries are established without adequate hydrogeological and environmental impact assessments, increasing the risk of environmental contamination and public health hazards. Similar concerns were raised by Lima et al. (2025), who emphasised the necessity of implementing environmental monitoring systems, impermeable burial zone lining, and land reclamation strategies to mitigate contaminant migration.

The other popular body disposal method is a flame cremation, with ashes to be deposited in a grave or columbarium. Cremation is commonly, though mistakenly, considered a more environmentally friendly form of burial, but research suggests otherwise. While this form of body disposition reduces the land acreage required for burial, it is by no means environmentally neutral. Flame cremation consumes huge amounts of energy, where the process lasts approximately 2–3 h and is conducted at temperatures around 1,000°C, producing an average carbon footprint of 243 kg for every burnt human body. Analysing soils beneath cremation urns in Germany, Mordhorst et al. (2022) identified elevated concentrations of lead, chromium, nickel, zinc and copper. The authors list that these metals originate from both the human remains themselves as well as the materials destroyed during cremation or used in urn construction.

In response to a growing awareness of the environmental risks, alternative funeral solutions are attracting increasing interest, including green burial, biodegradable urns, alkaline hydrolysis, natural organic reduction (body composting), and conservation burial (Ibrahim et al., 2023; Lima et al., 2025). These solutions intent to limit the use of toxic materials, reduce pollutant emissions, and integrate the burial process more naturally into the already well-functioning ecosystems (Fig. 2).

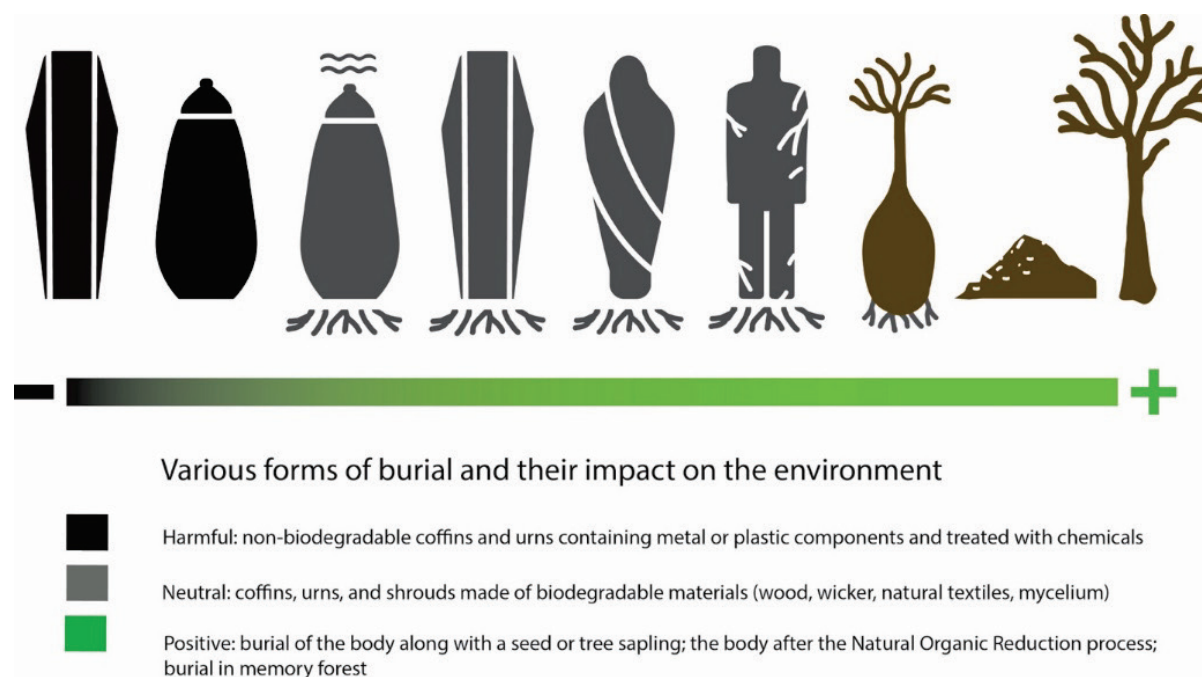


Fig. 2. The most popular forms of interment (2026) listed according to their ecological footprint: non-biodegradable coffins and urns; biodegradable coffins, urns, and shrouds; mushroom suits; Capsula Mundi or other forms with a seed or tree sampling; the body after natural organic reduction process; conservational burial in memory forest or meadow

Source: own elaboration with graphic by Katarzyna Krzykawska Apolinarski, 2026.

DEATH POSITIVITY AND THE ECOLOGICAL RETHINKING OF DEATH

Currently, there is a marked shift in social and cultural attitudes towards death and funeral practices. Literature accentuates that the contemporary Western societies have long operated within a model described as “death denial”, characterised by the marginalisation of death in the public sphere, the medicalisation of the dying process, and the gradual separation of death from everyday social experience (Király & Köves, 2023; Wilson et al., 2024). Death has been heavily institutionalised and relegated to the realm of hospitals, hospices, long-term care facilities, and the specialised funeral industry, while the process of bodily decomposition and humanity’s relationship with nature have been largely concealed from the public (Moisseeff, 2021).

Moisseeff (2021) points out that contemporary Western culture often views the dead body as an object requiring isolation, preservation, and sanitary control. The process of embalming, the use of airtight coffins, and practices aimed at “aestheticising” death lead to a further separation of the human body from natural ecological processes. Similar observations are presented by Király and Köves (2023), who note that the culture

of death avoidance remains strongly linked to the dominant consumerist model and an anthropocentric approach to the environment. The authors stress that contemporary societies often respond to the fear of death through consumption, control, and the technologization of life and dying, which may further reinforce unsustainable patterns of social functioning.

In response to these developments, a movement known as “death positivity” has emerged, aiming to foster a more open and reflective approach to death, dying, and end-of-life planning (Wilson et al., 2024). This movement promotes the normalisation of conversations about death, greater awareness of the biological processes associated with dying, and the pursuit of more ethical and environmentally friendly funeral practices. Wilson et al. (2024) point out that contemporary societies are often more willing to talk about death than dominant cultural narratives suggest. The authors emphasize, however, that conversations about death are usually easier on an abstract level than when one is directly confronted with one’s own mortality or the death of a loved one.

The rise of death positivity is also linked to a shift in how the relationship between the human body and the natural environment is perceived. It is increasingly recognised that after a death, the body can be viewed not as waste requiring isolation, but as part of a broader ecological cycle (Hong, 2025). Hong (2025), in analysing contemporary funeral practices in South Korea, points to a growing interest in the idea of “giving the body back to nature”, which involves a more natural integration of the body’s decomposition process into functioning ecosystem. The author also demonstrates the importance of ecological design thinking in designing more sustainable funeral systems and the need to consider the environmental consequences of memorial practices.

The contemporary shift in attitudes towards death also includes the development of new forms of spirituality and alternative memorial practices. Gould et al. (2024) describe a phenomenon referred to as “Buddhist deathstyles”, which encompasses practices inspired by a Buddhist philosophy, mindfulness, and a more contemplative approach to the process of dying. The authors spotlight that contemporary funeral practices are moving away from rigidly institutionalised religious and biomedical models towards more individualised, emotional, and ecological ways of experiencing death. A particular importance is placed on compassion, closeness to nature, and a more mindful approach to the end of life.

Another key element of contemporary reflection on death is the development of the concepts of “eco-grief” and “ecological mourning”. Radomska (2023) implies that, in the context of the climate crisis, biodiversity loss, and environmental degradation, death is no longer viewed solely in individual and human terms. Issues related to “more-than-human death” including species extinction, ecosystem degradation, and the loss of ecological relationships, are gaining an increased importance. Grief and remembrance are beginning to encompass not only humans and their lives, but also the natural environment and other organisms that co-create the ecosystems.

Contemporary ecological practices related to death may be a part of a broader social transformation concerning the relationship between humans, the nature and the landscape (Király & Köves, 2023; Slominski, 2023). Death is increasingly interpreted not as a moment of complete separation from the biological world, but as part of the ecological and material processes occurring in the environment, a continuum. In this context, green burials and conservation burials fit into a broader trend of ecologically redefining death and memorial spaces. As a result, contemporary funeral landscapes are no longer merely places of burial and remembrance but are interpreted as ecological memorial landscapes that integrate biological processes, nature conservation, social reflection, and new forms of memorial culture. This transformation points to a gradual shift from a highly controlled and technocratic model of death towards more ecological, relational, and landscape-based understanding of the processes of dying and remembrance.

CONSERVATION BURIAL AND MEMORIAL FORESTS AS MULTIFUNCTIONAL LANDSCAPES

In recent years, a model known as “conservation burial”, an extension of the concepts of “green burial” and “natural burial”, has been gaining an increasing prominence. Unlike standard eco-friendly forms of burial, conservation burial focuses not only on reducing the negative environmental impact of the funeral process itself, but also on actively protecting and restoring the landscape and ecosystems (Coutts et al., 2018). This model suggests that burial sites can simultaneously serve as memorial spaces, nature conservation areas, and elements of green landscape infrastructure.

Coutts et al. (2018) present that conservation burial is one of the most advanced approaches to ecological memorialisation, as it combines funeral practices with long-term land conservation, often carried out by land trust organisations. The authors suggest that funds generated from burials can support the conservation of areas threatened by urbanisation, habitat fragmentation, or environmental degradation. The burial site becomes part of a strategy for landscape and biodiversity conservation.

A key element of conservation burial is the creation of memorial forests and other forms of ecological memorial landscapes based on the preservation or restoration of natural vegetation. Unlike traditional park cemeteries, which are characterised by intensively maintained lawns, regular spatial geometry, and a significant amount of technical infrastructure, memorial forests utilise more natural ecological processes, such as plant succession, habitat regeneration, and the protection of native plant and animal species (Clayden et al., 2018; Säumel et al., 2023).

Contemporary memorial forests are designed as multifunctional landscapes that integrate ecological, social, and cultural functions. McClymont and Sinnett (2021) highlight that such spaces can play a significant role in the structure of urban green infrastructure by supporting water retention, mitigating the urban heat island effect, protecting habitats, and improving residents’ quality of life. Similar observations are presented by Sallay et al. (2022), who note that contemporary cemeteries are beginning to serve recreational and educational functions, thus becoming places for walking, connecting with nature, and reflecting on the relationship between humans and the environment.

The significance of memorial forests is also linked to the growing interest in the nature-based solutions and a more environmentally friendly approach to urban planning. Säumel et al. (2023) note that cemeteries can serve as important elements of resilient urban landscapes that support cities’ adaptation to climate change and space constraints. The authors state that less intensive forms of cemetery green space management help increase biodiversity and improve the stability of urban ecosystems.

Literature also extensively discusses the symbolic dimension of memorial forests. Hong (2025) points out that contemporary ecological funeral practices are moving away from treating the body as something that must be isolated from the environment and instead promote a more relational and ecological understanding of waste and the materiality of the human body. The process of bodily decomposition is interpreted as part of the natural cycle of matter and energy within an ecosystem. Similar observations are presented by Király and Köves (2023), who note that a more conscious and ecological approach to death can foster the development of attitudes related to environmental responsibility and a more reflective attitude towards consumption and the use of space.

Another important element of contemporary ecological memorial landscapes is the reduction of the materiality of traditional forms of commemoration. In many memorial forests, traditional headstones, concrete infrastructure elements, and heavily altered spatial layouts are being replaced by more discreet forms of commemoration, including natural stones, trees, small terrain markers, and digital geolocation systems (Clayden et al., 2018; Fig. 3). These solutions help reduce pressure on the landscape and preserve the space’s more natural character.



Fig. 3. Traditional headstones versus natural rock markers. Two cemetery sections within a hybrid cemetery: historic (left) and green burial (right). Fernwood Cemetery, Mill Valley, California

Source: photos by Katarzyna Krzykawska Apolinarski, 2025.

Despite the numerous advantages of conservation burials and memorial forests, the development of these models continues to face several social, legal, and cultural barriers, as well as a general hesitation. In many countries, burial regulations remain primarily tailored towards traditional forms of memorialisation, which hinders the implementation of more environmentally friendly and alternative solutions (Coutts et al., 2018). Additional challenges include issues related to the long-term management of memorial sites, funding for the nature conservation, and public acceptance of more natural forms of burial.

DISCUSSION

The above-presented analysis shows that contemporary funeral spaces are undergoing a gradual transformation from a highly structured, historically based, sanitary, and material-intensive model towards more ecological, landscape-oriented, and multifunctional forms of memorialisation (Shelvock et al., 2022; Säumel et al., 2023; Slominski, 2023). A green burial and a conservation burial should therefore not be viewed solely as alternative funeral practices, but as part of a broader shift in how we understand cemeteries, landscapes, and the relationship between humans and nature (Clayden et al., 2018; Coutts et al., 2018).

One of the key findings from the literature review is that traditional burial practices generate an environmental impact, including the consumption of wood, steel, concrete, and frequently toxic chemicals, as well as a potential risk of soil and groundwater contamination (Keijzer, 2017; Gonçalves et al., 2023; Ibrahim et al., 2023; Pawlett et al., 2024). Green burial addresses the need to reduce material consumption, chemical use, and the excessive technification of the burial process. Its significance, however, extends beyond merely reducing negative environmental impact. Natural forms of burial also change the way memorial spaces are designed, promoting landscapes based on native vegetation, minimal infrastructure and impact, and more natural ecological processes (Clayden et al., 2018; Coutts et al., 2018).

Another important aspect is the changing perception of cemeteries in urban planning. Until now, cemeteries have often been treated as specialised, enclosed, and single-purpose spaces associated with remembrance and a burial. Contemporary literature shows, however, that they can serve as important elements of urban green infrastructure, supporting biodiversity, water retention, mitigation of the urban heat island effect

and urban sprawl, and the provision of ecosystem services (McClymont & Sinnett, 2021; Sallay et al., 2023; Säumel et al., 2023). This means that cemeteries can be analysed not only as cultural and religious sites but also as components of urban ecological systems.

Conservation burials and memorial forests represent a particularly interesting direction for future development. These models combine a function of burial with the protection of green spaces, landscape restoration, and long-term natural resource management. Unlike a traditional cemetery, whose primary function is the permanent interment of remains and their commemoration, conservation burial integrates death into a broader ecological cycle and into the process of landscape conservation (Coutts et al., 2018). This approach allows a funeral space to be transformed into an active element of nature conservation, rather than merely a space that separates death from social and biological life. Those burial grounds could be promoted by city planners as urban green structures due to the special protection afforded by their sacred nature and the presence of human remain.

Cultural change is also an important aspect of this transformation. The rise of death positivity, environmental awareness, and new forms of spirituality suggests that a segment of society is beginning to seek out more reflective, simple, and environmentally responsible ways of saying goodbye (Király & Köves, 2023; Slominski, 2023; Wilson et al., 2024). Death is no longer interpreted solely as a medical or a technical event, but has become part of a reflection on the materiality of the body, environmental responsibility, and the relationship between humans and ecosystems (Radomska, 2023). Green burial and conservation burial are not only funeral practices but also forms of cultural response to the environmental crisis.

However, it should be noted that the development of eco-friendly burial models faces numerous constraints. Among the most significant are legal, religious, economic, and organisational barriers that hinder the implementation of alternative burial models within existing funeral systems (Yarwood et al., 2015; Nosi et al., 2024; Yu, 2024). In many countries, burial regulations are still based on assumptions specific to traditional cemeteries, which limit the possibility of implementing more eco-friendly solutions (Fig. 4). Another important issue is the question of social acceptance of the natural decomposition of the body, the move away from traditional headstones, and more discreet forms of commemoration (Shelvock et al., 2022). For this reason, the transformation of funeral spaces requires not only design changes but also public education, cultural dialogue, and an appropriate legal framework.



Fig. 4. Information about a ban on grave candles and artificial flowers (left), and plastic lanterns within green burial section (right). Junikowo Cemetery, Poznań, Poland

Source: photos by Katarzyna Krzykawska Apolinarski, 2026.

From the perspective of landscape architecture and spatial planning, green burials and conservation burials open up new possibilities for designing cemeteries as living, dynamic, and ecologically active landscapes (McClymont & Sinnett, 2021; Säumel et al., 2023). Future funeral spaces can serve as places of remembrance, natural habitats, ecological corridors, recreational spaces, and tools for the conservation of green areas (Sallay et al., 2022; Jaszczak et al., 2026). This reinterpretation of the cemetery is part of a broader search for more sustainable models of land use in cities and suburban areas. Hence, these solutions create also a risk of moving burial properties to peripheries or rural areas, often requiring the use of ecologically sensitive land assets.

The analysis indicates that the transition from a traditional cemetery to an “ecological memorial landscape” does not merely signify a change in the form of burial but represents a broader transformation encompassing funeral practices, landscape design, environmental protection, and the culture of remembrance (Radomska, 2023; Slominski, 2023; Fischer, 2025). The cemetery of the future may become not only a place of burial but also a space for regeneration, conservation, and reflection on humanity’s place within natural cycles (Francis, 2003; McClymont & Sinnett, 2021).

Contemporary ecological memorial landscapes also call for a redefinition of the aesthetics of funeral spaces. The traditional cemetery model, based on regular plot layouts, a predominance of mineral elements, and a high degree of spatial control, is gradually being replaced by a more naturalistic and landscape-oriented design approaches. Native vegetation is increasingly being used, impervious surfaces are being reduced, and highly geometric spatial layouts are being abandoned in favour of more organic and ecologically integrated landscape compositions. These tend to be a part of a broader development of nature-based solutions and urban design focused on increasing ecological resilience, water retention, and supporting biodiversity. In this context, the funeral space ceases to be merely a place that separates death from social life and instead becomes part of a dynamic and biologically active urban landscape (Clayden et al., 2018; McClymont & Sinnett, 2021; Säumel et al., 2023).

CONCLUSIONS

The adoption of biodegradable materials and a symbolic “return” of human biomass to natural biological cycles offer solutions that can transform the future of cemeteries, the cultural framework surrounding death, and urban spatial planning. Integrating burial grounds into active ecosystems delivers undeniable environmental benefits, particularly within urbanised regions.

This “new and modern” approach to cemetery design will have broader implications for environmental engineers, architects, landscape architects, tombstone manufacturers, and many other professionals involved in designing the appearance and function of burial spaces. Nature-based solutions within green and conservational cemeteries will affect ground stabilisation, internal infrastructure, paving materials used for walkways, the function and style of buildings, the selection of vegetation, the aesthetics of memorials, and many more.

This review, analysis and suppositions based on latest selected specialised literature, can serve as an introduction to a further, more detailed research on the impact of natural burial and cemetery design on urban planning. Among others, topics for future studies may include:

- systematic integration of cemeteries with natural burial into urban ecosystems,
- planning of urban green spaces with designated nature reserves serving as conservation burial fields,
- financing of nature reserves by combining nature conservation functions with those of ecological burial sites,
- transforming a cemetery model based on regular plots into models based on ecosystems that are integrated with the local natural environment.

As new generations of consumers come of age, demographic groups that demonstrate a greater statistical preference for environmental values, minimalism, and responsible consumption, the transformation of funeral spaces, practices and choices has a strong chance of succeeding. Green and conservation burials provide a direct response and an immediate solution to the search for more ecological cemetery models of the present and the future. However, this architectural and spatial evolution and social revolution must be accompanied by public education, robust cultural dialogue, and adaptive and progressive legal frameworks. Ultimately, alterations to the design of burial landscapes must be sensitively tailored to the unique cultural matrices, communities, and religious traditions of the societies they serve.

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REFERENCES

- Afangideh, C. B., & Udokpoh, U. U. (2022). Environmental impact assessment of groundwater pollution within cemetery surroundings. *Indian Journal of Engineering*, 19(51), 100–115. https://www.discoveryjournals.org/engineering/current_issue/2022/v19/n51/A8.pdf
- Andersson, E., Barthel, S., & Ahrné, K. (2007). Measuring social-ecological dynamics behind the generation of ecosystem services. *Ecological Applications*, 17(5), 1267–1278. <https://doi.org/10.1890/06-1116.1>
- Clayden, A., Green, T., Hockey, J., & Powell, M. (2018). Cutting the lawn – Natural burial and its contribution to the delivery of ecosystem services in urban cemeteries. *Urban Forestry & Urban Greening*, 33, 99–106. <https://doi.org/10.1016/j.ufug.2017.08.012>
- Coutts, C., Basmajian, C., Sehee, J., Kelty, S., & Williams, P. C. (2018). Natural burial as a land conservation tool in the US. *Landscape and Urban Planning*, 178, 130–143. <https://doi.org/10.1016/j.landurbplan.2018.05.022>
- Długoński, A., Dushkova, D., & Haase, D. (2022). Urban cemeteries – Places of multiple diversity and challenges. A case study from Łódź (Poland) and Leipzig (Germany). *Land*, 11(5), 677. <https://doi.org/10.3390/land11050677>
- Długozima, A., Kosiacka-Beck, E. (2020). How to Enhance the Environmental Values of Contemporary Cemeteries in an Urban Context. *Sustainability*, 12(6), 2374. <https://doi.org/10.3390/su12062374>
- Długozima, A., Kosiacka-Beck, E. & Krzykawska, K. (2024). Multiuse cemetery paradigm: cemetery as a multifunctional place of social significance – reshaping a cemetery in the urban space of Eastern Europe. *Cities*, 156, 105556. <https://doi.org/10.1016/j.cities.2024.105556>
- Długozima, A., Kosiacka-Beck, E. & Krzykawska, K. (2026). Cemetery as multifaceted space with leisure uses in the urban American and Western European context. *Leisure Studies*, 45(2), 252–269. <https://doi.org/10.1080/02614367.2024.2428344>
- Ezenwa, I. M., Omoigberale, M., Abulu, R., Biose, E., Okpara, B., & Uyi, O. (2023). Burial leakage: A human accustomed groundwater contaminant sources and health hazards study near cemeteries in Benin City, Nigeria. *PLOS ONE*, 18(12), e0292008. <https://doi.org/10.1371/journal.pone.0292008>
- Fischer, N. (2025). Landscape and Remembrance of the Dead. In O. Kühne et al. (Eds), *Landscape Handbook: German Language Research Perspectives* (pp. 467–474). Springer Nature. https://doi.org/10.1007/978-3-031-83147-8_40
- Francis, D. (2003). Cemeteries as cultural landscapes. *Mortality*, 8(2), 222–227. <https://doi.org/10.1080/1357627031000087442>
- Gonçalves, V., Albuquerque, A., Carvalho, P., Almeida, P., & Cavaleiro, V. (2023). Groundwater vulnerability assessment to cemeteries pollution through GIS-based DRASTIC index. *Water*, 15(4), 812. <https://doi.org/10.3390/w15040812>
- Gould, J., Nissenbaum, M., & Turner, J. (2024). Dying “Buddhist”: Death, Diversity, and Worldview Complexity in and Beyond Australia. *Journal of Global Buddhism*, 25(2), 186–201. <https://doi.org/10.26034/lu.jgb.2024.4861>
- Green Burial Council [GBC]. (2021). *Opening, Closing, and Maintenance of a Green Burial Grave*. https://www.greenburialcouncil.org/wp-content/uploads/2025/09/opening_closing_and_maintenance_of_a_green_burial_grave.pdf

- Hong, J. (2025). *Designing an ecological death: Rethinking funeral systems through ecological design* (Master's thesis). Delft University of Technology.
- Ibrahim, M. A., Petersson, M., Åström, M., & Johansson, M. (2023). Physical environmental hazards associated with the Swedish death care industry. *Safety Science*, 165, 106195. <https://doi.org/10.1016/j.ssci.2023.106195>
- Itescu, Y., & Jeschke, J. M. (2024). Assessing the conservation value of cemeteries to urban biota worldwide. *Conservation Biology*, 38(6). <https://doi.org/10.1111/cobi.14322>
- Jaszczak, A., Kostecki, J., Pochodyła-Ducka, E., & Greinert, A. (2026). Cemeteries as sustainable elements of urban green space: Legal, ecological, and spatial perspectives from Central and Eastern Europe. *Sustainability*, 18, 212. <https://doi.org/10.3390/su18010212>
- Keijzer, E. (2017). The environmental impact of activities after life: Life cycle assessment of funerals. *The International Journal of Life Cycle Assessment*, 22(5), 715–730. <https://doi.org/10.1007/s11367-016-1183-9>
- Király, G., & Köves, A. (2023). Facing finitude: Death-awareness and sustainable transitions. *Ecological Economics*, 205, 107712. <https://doi.org/10.1016/j.ecolecon.2022.107712>
- Lima, B. B. M. e R., Marini, A. F., Manhães, A. J. P., Sales, D. S. da, Guimarães, H. A., Sales, C. M. R., & Correia, V. G. (2025). Cemeteries and environmental contamination: Strategies for control, monitoring and remediation. *Revista de Gestão Social e Ambiental*, 19(10), e013549. <https://doi.org/10.24857/rgsa.v19n10-018>
- Löki, V., Deák, B., Lukács, A. B., & Molnár, V. A. (2019). Biodiversity potential of burial places – A review on the flora and fauna of cemeteries and churchyards. *Global Ecology and Conservation*, 18, e00614. <https://doi.org/10.1016/j.gecco.2019.e00614>
- McClymont, K., & Sinnett, D. (2021). Planning cemeteries: Their potential contribution to green infrastructure and ecosystem services. *Frontiers in Sustainable Cities*, 3, 789925. <https://doi.org/10.3389/frsc.2021.789925>
- Menchetelli, V., & Dottorini, E. (2025). The cemetery landscape as a complex value. Understanding, documenting, and enhancing a liminal cultural heritage. *Disegnarecon*, 18(35). <https://doi.org/10.20365/disegnarecon.35.2025.21>
- Moisseeff, M. (2021). Dealing with death in contemporary Western culture: A view from afar. In G. Harvey, M. Houseman, S. M. Pike & J. Salomonsen (Eds), *Reassembling Democracy: Ritual as Cultural Resource* (pp. 179–192). Bloomsbury Academic. <https://doi.org/10.5040/9781350123045.ch-010>
- Mordhorst, A., Zimmermann, I., Fleige, H., & Horn, R. (2022). Environmental risk of (heavy) metal release from urns into cemetery soils. *Science of the Total Environment*, 817, 152952. <https://doi.org/10.1016/j.scitotenv.2022.152952>
- Neckel, A., Toscan, P. C., Kujawa, H. A., Bodah, B. W., Korcelski, C., Maculan, L. S., Silva, C. C. O. A., Gonçalves Junior, A. C., Snak, A., Dal Moro, L., & Silva, L. F. O. (2023). Hazardous elements in urban cemeteries and possible architectural design solutions for a more sustainable environment. *Environmental Science and Pollution Research*, 30, 50675–50689. <https://doi.org/10.1007/s11356-023-25891-z>
- Nosi, C., D'Agostino, A., Ceccotti, F., & Sfodera, F. (2024). Green funerals: Technological innovations and societal shifts toward sustainable death care practices. *Technological Forecasting and Social Change*, 207, 123644. <https://doi.org/10.1016/j.techfore.2024.123644>
- Ojo, O. A., Oyelami, C. A., Fakunle, M. A., Ogundana, A. K., Ajayi, O. E., & Uche, T. E. (2022). Integrated approach to unsaturated zone characterization as it relates to burial practices and its impact on the immediate environment. *Heliyon*, 8(7), e09831. <https://doi.org/10.1016/j.heliyon.2022.e09831>
- Pawlett, M., Girkin, N. T., Deeks, L., Evans, D. L., Sakrabani, R., Masters, P., Garnett, K., & Marquez-Grant, N. (2024). The contribution of natural burials to soil ecosystem services: Review and emergent research questions. *Applied Soil Ecology*, 194, 105200. <https://doi.org/10.1016/j.apsoil.2023.105200>
- Ponce Arguello, M., Crisanto-Perrazo, T., Vizuete, D., Ocaña Garzón, E., Guevara Garcia, P., Aldás, M. B., Jaramillo, S., & Toulkeridis, T. (2024). Evaluation of water contamination caused by cemeteries in Central Ecuador – A warning for the authorities. *Water*, 16(16), 2310. <https://doi.org/10.3390/w16162310>
- Radomska, M. (2023). Ecologies of death, ecologies of mourning: Towards more-than-human grief in the Anthropocene. *Environmental Humanities*, 15(2), 312–329.
- Rugg, J. (2000). Defining the place of burial: What makes a cemetery a cemetery? *Mortality*, 5(3), 259–275. <https://doi.org/10.1080/713686011>
- Säumel, I., Butenschoen, S., & Kreibitz, N. (2023). Gardens of life: Multifunctional and ecosystem services of urban cemeteries in Central Europe and beyond – Historical, structural, planning, nature and heritage conservation aspects. *Frontiers in Environmental Science*, 10, 1077565. <https://doi.org/10.3389/fenvs.2022.1077565>

- Sallay, Á., Gecséné Tar, I., Mikházi, Z., Takács, K., Furlan, C., & Krippner, U. (2023). The role of urban cemeteries in ecosystem services and habitat protection. *Plants*, 12(6), 1269. <https://doi.org/10.3390/plants12061269>
- Sallay, Á., Mikházi, Z., Gecséné Tar, I., & Takács, K. (2022). Cemeteries as a part of green infrastructure and tourism. *Sustainability*, 14(5), 2918. <https://doi.org/10.3390/su14052918>
- Shellock, M., Kinsella, E. A., & Harris, D. (2022). Beyond the corporatization of death systems: Towards green death practices. *Illness, Crisis & Loss*, 30(4), 640–658. <https://doi.org/10.1177/10541373211006882>
- Slominski, E. M. (2023). Life of the death system: Shifting regimes, evolving practices, and the rise of eco-funerals. *Sustainability: Science, Practice and Policy*, 19(1), 2243779. <https://doi.org/10.1080/15487733.2023.2243779>
- Stock, P. V., & Dennis, M. K. (2023). Up in smoke or down with worms? Older adult environmentalist's discourse on disposal, dispersal, and (green) burial. *Mortality*, 28(1), 73–89. <https://doi.org/10.1080/13576275.2021.1878121>
- Straka, T. M., Mischo, M., Petrick, K. J., & Kowarik, I. (2022). Urban cemeteries as shared habitats for people and nature: Reasons for visit, comforting experiences of nature, and preferences for cultural and natural features. *Land*, 11(8), 1237. <https://doi.org/10.3390/land11081237>
- Villaseñor, N. R., & Escobar, M. A. H. (2019). Cemeteries and biodiversity conservation in cities: How do landscape and patch-level attributes influence bird diversity in urban park cemeteries? *Urban Ecosystems*, 23, 133–143. <https://doi.org/10.1007/s11252-019-00877-3>
- Webster, L. (2016). *The science behind green burial*. Green Burial Council. https://www.greenburialcouncil.org/science_green_burial.html
- Webster, L. (2023). *Exchanging gifts: Natural burial is a conservation strategy*. Land Trust Alliance.
- Wilson, E., Caswell, G., Turner, N., & Pollock, K. (2024). Talking about death and dying: Findings from deliberative discussion groups with members of the public. *Mortality*, 29(1), 176–192. <https://doi.org/10.1080/13576275.2022.2136515>
- Yarwood, R., Sidaway, J. D., Kelly, C., & Stillwell, S. (2015). Sustainable deathstyles? The geography of green burials in Britain. *The Geographical Journal*, 181, 172–184. <https://doi.org/10.1111/geoj.12087>
- Yu, Q. F. (2024). A study on the relationship between sustainable development strategies in the funeral industry and eco-friendly natural burials. *Advances in Management & Applied Economics*, 14(6), 157–169. <https://doi.org/10.47260/amae/1468>

OD CMENTARZY DO EKOLOGICZNYCH KRAJOBRAZÓW PAMIĘCI: ROZWÓJ POCHÓWKU NATURALNEGO I CMENTARZY LEŚNYCH ORAZ ZWIĄZANE Z TYM MOŻLIWOŚCI DLA PLANOWANIA MIAST

STRESZCZENIE

W artykule przeprowadzono przegląd współczesnej literatury naukowej (2000–2026), ukierunkowany na analizę środowiskowych aspektów tradycyjnych praktyk pogrzebowych oraz na przedstawienie modeli cmentarzy zrównoważonych: cmentarza z pochówkiem naturalnym (ang. *green burial*) i lasu pamięci (ang. *conservational burial*). Interdyscyplinarny przegląd literatury obejmuje architekturę krajobrazu, urbanistykę, ekologię miejską, nauki o środowisku oraz badania nad rozwojem zrównoważonym. Krajobrazy pamięci sprzyjające „powrotowi” biomasy ludzkiej do cykli biologicznych mogą tworzyć ekosystemy łączące się z miejską zieloną infrastrukturą oraz przekształcać koniec życia w aktywny mechanizm ochrony środowiska przyrodniczego. Urbaniści i architekci krajobrazu mogą promować włączanie takich cmentarzy do systemów przyrodniczych miasta. Autorka sugeruje, że pomimo istnienia barier prawnych, religijnych i kulturowych wzrost popularności prośrodowiskowych praktyk pogrzebowych sygnalizuje pokoleniową ewolucję w kierunku odpowiedzialności ekologicznej i „pozytywnego podejścia do śmierci”.

Słowa kluczowe: miejska zielona infrastruktura, cmentarz zrównoważony, pochówek naturalny, krajobrazy cmentarne, cmentarne usługi ekosystemowe