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OPINION

Catalysts for change: Museum gardens in a planetary emergency

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Societal Impact Statement

Natural history museums are often seen as places with indoor galleries full of dry-dusty specimens, usually of animals. But if they have gardens associated with them, museums can use living plants to create narratives that link outside spaces to inside galleries, bringing to life the challenges facing biodiversity. We describe the redevelopment of the grounds of the Natural History Museum in London to create a garden with plants at its centre to address these challenges. People are key to the future of our planet and reaching them in novel ways will be central to creating advocates for the planet.

Summary

The South Kensington site of the Natural History Museum in London is framed by two hectares of grounds that have had a variety of uses since the opening of the buildings in 1881. Original plans for their development were never carried out, and most of the site was planted in amenity grassland, although a small Wildlife Garden was established in the 1990s. Redevelopment of the grounds through the Urban Nature Project has allowed using the space to create new narratives of evolution and individual action, with plants central to the design. With more than 6 million visitors a year, the Museum has a unique opportunity to use its gardens to place nature at the forefront of the visitor experience. Here, we describe the background to this redevelopment and the resultant spaces created, and highlight the opportunities for museums to develop outdoor spaces into new areas for both visitor experience and scientific research.

KEYWORDS

education, living collection, natural history museum gardens, planetary emergency, plant stories, planting scheme, research

"The future of the natural world, on which we all depend, is in our hands"

-Sir David Attenborough

1 | INTRODUCTION

Natural history museums have a key role to play in providing solutions to the linked biodiversity and climate crises. In addition to being active collections-led research centres (Johnson & Owens, 2023), their visitors and wider public profile provide important avenues for education and science communication (Bakker et al., 2020). In 2020, the Natural History Museum in London declared a planetary emergency and, in keeping with many nature-led institutions, refocused its strategic direction to tackle some of the biggest challenges faced by people and biodiversity. With a mission to create empowered advocates for the planet, the institution's core research focuses on developing solutions from and for nature (NHM, 2020).

> *"The challenge for natural history museums is to tell the real stories of biological diversity and connect them to the everyday life of our visitors."*
>
> (Krishtalka & Humphrey, 2000)

Delivering this mission has pushed us to consider how we can maximise the use of our public galleries and digital media to communicate the natural diversity of our planet, explain the science-led evidence behind the environmental challenges we face, and inspire and support diverse audiences to develop the agency to take positive action.

Outdoor spaces at museums have been historically secondary to the indoor galleries, yet can play an important dual role in orienting visitors to narratives of the indoor gallery experience and as living collections that directly connect local and international audiences with key environmental issues. Because plants are the backbone of curated outdoor spaces, gardens are an ideal way to bring plants to museum audiences, often attracted by other offerings. Core to our strategy has been reimagining the two hectares of gardens that front the Museum's Waterhouse Building and Darwin Centre at our main central London site of South Kensington. We have recently redeveloped these gardens to mirror and enhance the mission of our indoor spaces. Our new garden designs place living nature at the forefront of the visitor experience. They focus on change, telling an Earth Systems story from the evolution of life on land to the deleterious impacts we are having as humans. Through the lenses of deep time and contemporary urban biodiversity, we are aiming to create a space in which our visitors can reflect on their relationship with nature and identify nature-positive actions they can take.

Whilst it is still early days, in the 12-month period after opening in July 2024, museum exit surveys show that these new gardens welcomed over 5 million visitors. During the first 6 months alone, 370,000 people visited solely to spend time within the gardens. In this opinion piece, we reflect on the history of the Natural History Museum's gardens, provide an overview of their new nature-focused narrative, and highlight why we believe that museum gardens can and must play a more active role in creating science-informed advocates for the planet.

2 | A SHORT HISTORY OF THE NATURAL HISTORY MUSEUM'S GARDENS

The site now occupied by the Natural History Museum and its gardens was once home to the vast, though short-lived, International Exhibition Building of 1862, most of which was demolished just two years later in 1864. To the north, on land currently occupied by Imperial College, the Royal Horticultural Society maintained approximately 20 acres (8 ha) of gardens from 1861 until around 1886. These gardens, inspired by Italian architectural styles, were richly adorned with statues and sculptures (Sheppard, 1975). Construction of the Alfred Waterhouse-designed Museum building began in 1873 (Stearn, 1981), and by 1879, some attention was paid to the landscaping of the grounds. Several iterations of a formal planting design were proposed, but these designs were only partially implemented, with ornate railings around the garden perimeter considered a more permanent and lower maintenance investment (Stearn, 1981). Despite this apparent minimalist approach, a wooded area in the west of the gardens is clearly visible in Ordnance Survey maps dated 1894.

Through the twentieth century, the gardens were used in assorted highly practical ways, but never with a coherent site-wide horticultural design. For much of this time, the only permanent geological exhibits were the large fossil tree trunk of Carboniferous age from Edinburgh and a small sarsen stone discovered during excavation of the foundations of the Victoria and Albert Museum (Edwards, 1932). During the First World War, part of the garden was transformed into allotments and a farm (Schindler, 2019). As the Museum buildings footprint grew over the 20th and early 21st Century, the area devoted to gardens became smaller. A marked shift in philosophy was seen in 1995, when a small Wildlife Garden featuring key habitats of southern England was opened in the west corner of the grounds for educational purposes (Honey et al., 1998). With a clear focus on planting and ecology, this included areas of chalk grassland, meadow, broad-leaved woodland, freshwater aquatic and fenland habitats. Since establishment, the biodiversity of the Wildlife Garden has been intensively studied, with 3,430 species identified and recorded to date, including several arthropod species new to the UK and many first sightings at a regional level (e.g. McCarter et al., 2022; Notton, 2018). This represents 26% of the species diversity that has been recorded from the entirety of Greater London (based on publicly accessible biological records data, NBN Atlas, 2025), an area over 77,000 times the size - arguably proof of the adage that the more you look, the more you find! Structured surveys of the Wildlife Garden habitats to date have recorded 616 species of flowering plants, 19 species of ferns and 80 species of bryophytes, along with 380 species of fungi and lichens. Whilst undoubtedly a haven for nature and visitors that were 'in the know',

the Wildlife Garden was surrounded by hedgerow and tucked into one corner of the site. It remained a hidden jewel that was accessed by less than 5% of the Museum's total annual visitors.

In contrast to the comparative stability in the quiet western corner of the gardens, recent use of the much busier eastern side has been far more varied and dominated by commercial activity, including as a location for London Fashion Week, a seasonal butterfly house, an ice rink and fairground over the Christmas period and a low diversity lawn that doubled as a picnic area for visitors in the summer. Alfred Waterhouse's original intentions of creating a coherent landscape and planting design across the Museum's grounds were never realised.

Historical and recent change can also be seen in botanical specimens collected from across the site, starting with its use as the site of the International Exhibition of 1862. The first herbarium sheet we have found in the NHM collections is from 1865, a collection of reversed clover (*Trifolium resupinatum* L.) collected at "Site of the Exhibition, Sth. Kensington" (BM000782460). Herbarium specimens from the 19th and 20th centuries largely comprise herbaceous taxa from disturbed ground (Figure 1) or escaped horticultural plants, but complete surveys were never done, and these data are extremely patchy (specimen records available in Dataset S1 and on the NHM Data Portal, doi:10.5519/15eltdkq). More recent botanical records have been largely observational and showed an increase in plant diversity following the planting of the Wildlife Garden and into the 21st Century.

3 | TIME FOR CHANGE

The scale of the planetary emergency necessitates widescale, evidence-informed action. National natural history museums have a large visitor reach and – we argue – a central responsibility to raise awareness of the human-driven crises of climate change and biodiversity loss and communicate potential solutions. Helping people to understand the challenge and directly connect with nature and biodiversity science are key steps in creating empowered advocates for the planet. To quote Sir David Attenborough "*no one will protect what they don't care about, and no one will care about what they have never experienced*". Additionally, we feel that is it important to 'walk the walk' and actively demonstrate the positive steps that we are making as an institution to help nature recover.

Through the Natural History Museum's UK-wide Urban Nature Project, we took on the challenge of determining how we could most effectively landscape and curate the Museum's gardens to enable nature-focused engagement, education and research, whilst improving access and creating a more welcoming environment for over 6 million visitors each year, many of whom will be visiting for the first time. We used the redevelopment of our gardens as an opportunity to accelerate our wider institutional sustainability strategy, including by enforcing a diesel-free construction site, achieving net zero carbon and by sourcing provenanced, peat-free plants for landscaping wherever possible, still more difficult than it should be.

After fundraising and a two-year build that worked with existing biodiversity in the Wildlife Garden, our new gardens opened in July 2024 with plants central to the narrative. Although urban gardens will never be truly wild places, they are increasingly important spaces in which biodiversity can persist and recover and where people can access the mental and physical well-being benefits of nature (Kowarik et al., 2025; Ventura et al., 2024). As access to nature in urban spaces is not equitable (e.g. Venter et al., 2023; Winkler et al., 2024), we hope that our new free-to-access gardens will provide an accessible community green space in Central London as part of a highly visible agenda for change.

4 | EAST TO WEST THROUGH THE MUSEUM GARDENS

4.1 | The Evolution Garden

The Evolution Garden takes our visitors on a journey, giving them a feel for the scale of geological time and how life on Earth has changed over hundreds of millions of years. Along the way, they pass through different geological periods that tell this story of change using rocks, fossils and sculptures or inlays of animals, coupled with plants appropriate for the periods of geological history. Plants in the garden also tell their own tales of evolution, graphically showing how Earth and life are connected.

Visitors arriving at South Kensington London Underground station can enter the garden via the connecting Transport for London tunnel. Here, they walk through a spectacular ravine constructed of Precambrian rocks from Scotland, beginning with the Lewisian Gneiss, which is the oldest rock in the UK (Archean) from where a view opens onto the terracotta façade of the Waterhouse Building. From this point, the visitor journey is scaled to the Phanerozoic Eon, beginning with the Cambrian Period.

The first major planted area addresses the advent of life on land and the origins of forest ecosystems. The planting evokes the coal swamp forests of the Carboniferous Period. We are using eye-catching tree ferns as a canopy, which also includes an understory of small herbaceous ferns and horsetails. The trunks of the tree ferns with their parasol-like crowns of fronds resemble the growth forms of some of the earliest known small trees. The forest has a lush, leafy and vibrant ferny feel.

Moving into the Mesozoic Era, the centrepiece of the garden is a full-size bronze cast of the skeleton (ca. 21 m long) of the sauropod dinosaur *Diplodocus carnegii* Hatcher (Figure 2). This is set in a fern prairie and light woodland landscape recalling the Jurassic Period, including a variety of gymnosperm shrubs, small trees, cycads and herbaceous ferns. Here, the hard landscape is formed of rocks and fossils from the Portland Stone Formation of southern England. As we move into the Cretaceous Period, flowering shrubs and herbs are introduced for the first time as they were in evolutionary time.

The Cenozoic section of our garden links changes in Earth's climate on a global scale to the evolution of flora and fauna. The Paleogene planting references a time of much warmer climates in which fossil evidence from the London Clay Formation shows that

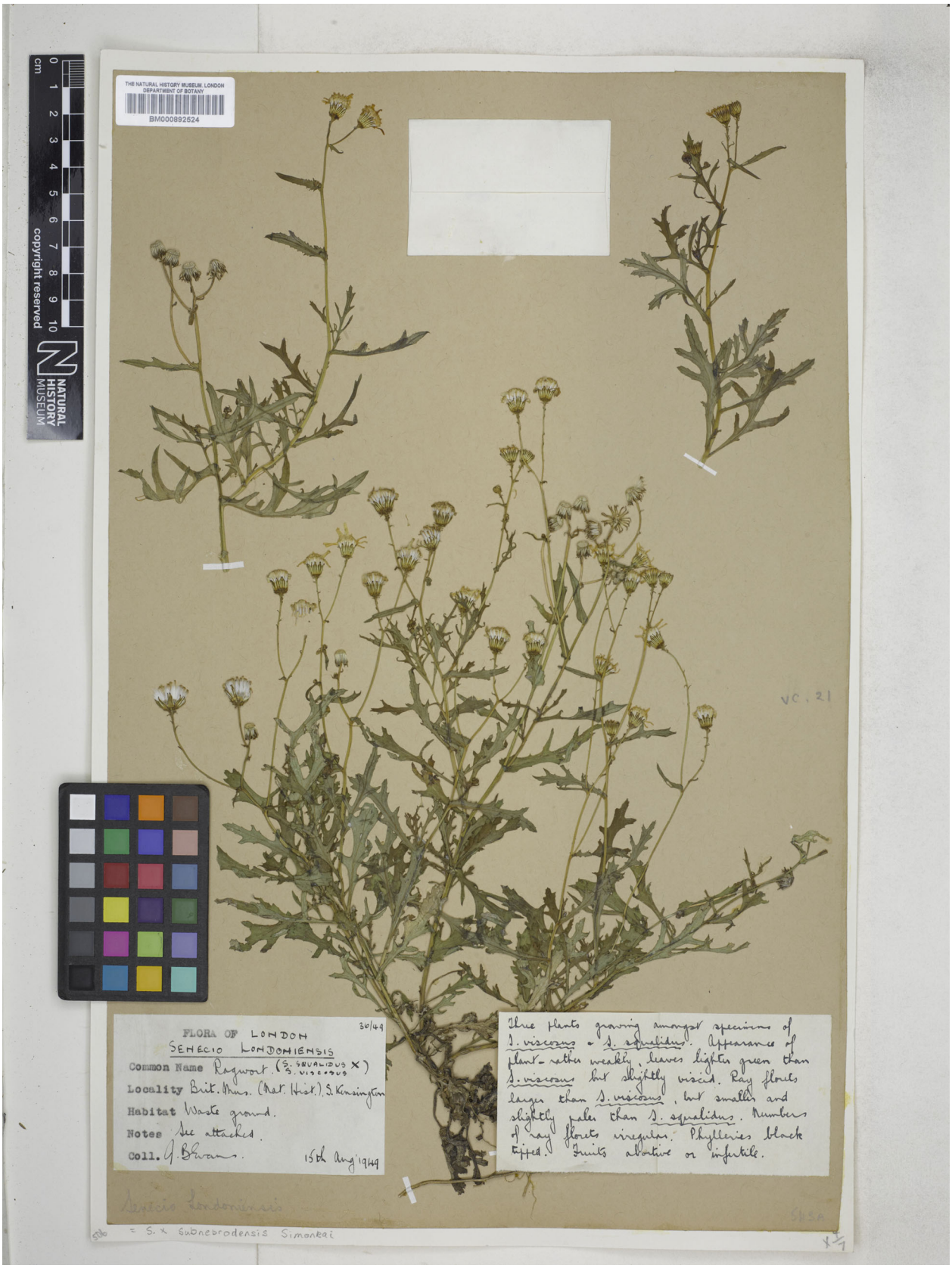

FIGURE 1 Herbarium specimen (BM000892524) of *Senecio* × *londinensis* Lousley collected in the Museum grounds in 1949, only 5 years after this hybrid between *S. squalidus* L. and *Senecio viscosus* L. was first described from disturbed bomb and construction sites in the London area (Lousley, 1944). Reproduced with permission of the Trustees of the Natural History Museum.

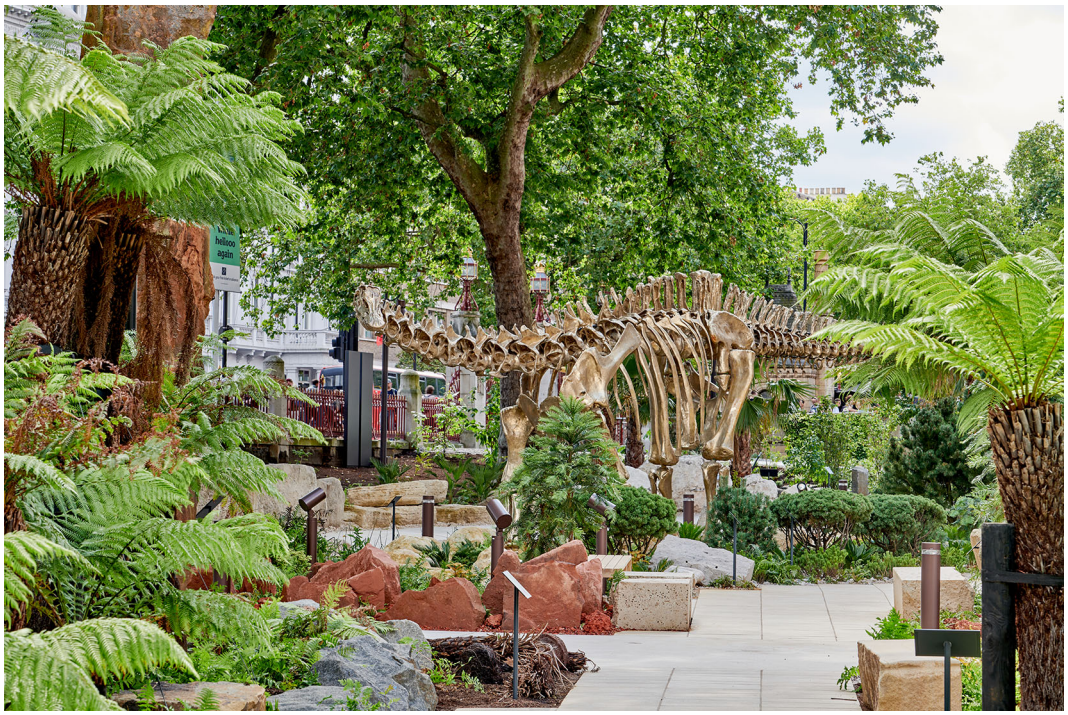

FIGURE 2 Bronze cast of *Diplodocus carnegii* set in planting that evokes the Jurassic Period, including conifers, cycads and ferns. The hard landscape is predominantly formed of Portland Stone and includes fossilised ammonites and wood. (c) Natural History Museum London. Reproduced with permission of the Trustees of the Natural History Museum.

subtropical conditions prevailed. Climate cooled during the Neogene, leading to the development of grasslands, and our planting introduces varied grasses and asterids to represent the explosion of flowering plant diversity.

Evolution is the overarching theme of the garden, and it is referenced through the interpretation of living plants and the animal sculptures and inlays. Tree ferns illustrate how tree-like growth can evolve in non-woody plants. Cycads show how insect pollination occurred in some gymnosperms before the evolution of flowers. The interpretation around the dinosaur links the evolution of its size and dentition to the nature of its herbivorous diet. Likewise, as Earth's climate cooled during the Neogene, large-hoofed herbivores, including horses, antelope and elephants adapted to the spread of grasslands.

Throughout the garden, we emphasise the interdependencies between the Earth System and evolutionary processes in the context of global change. From the first development of forests influencing the evolution of the atmosphere and climate and leading to the development of the world's oldest economically important coals, through major igneous provinces causing extinction, to climate cooling in the Cenozoic Era driving changes in flora and fauna, visitors are taken on a journey through time with plants at the centre.

4.2 | The entrance planters

Themes of evolution and climate change also feature in two planter beds flanking the cathedral-like main entrance of the Waterhouse building. Here, visitors enter the building past beds containing plants from the Macaronesian islands of the Canaries, Madeira and the Azores. Island endemics such as several species of *Echium* (incl. *Echium pininana* Webb & Berthel.), *Sonchus canariensis* (Webb) Boulos and *Geranium palmatum* Cav. demonstrate how plants that are closely related to familiar British natives can become giants due to isolated island evolution. Many Macaronesian plants are considered tender elsewhere in the UK, but here these species thrive in the warm microclimate of the Waterhouse Building entrance. These plants are also exemplars of the changing scientific view of plant diversity. As botanists voyaged to other continents, plants of these islands were often startlingly different to those with which they were familiar from northern Europe. The plants here relate directly to research being done at the Museum with historical collections (e.g. Jones et al., 2016; Press & Short, 1994), thus providing a link between research, galleries, collections and gardens.

4.3 | The Nature Discovery Garden

The gardens in the west of our site continue this narrative of change, but with a focus on current global challenges and how we can positively shift our relationship with the nature that surrounds us in towns and cities yet often goes unnoticed. The Nature Discovery Garden considers biodiversity now and into the future, highlighting the importance of urban biodiversity and the imperative to actively recover the natural world. The planting scheme and interpretation aim to support quiet

reflection and exploration of nature, with an interpretative focus on slowing down, looking and listening. Some of the interpreted materials featuring plants include yellow rattle's (*Rhinanthus minor* L.) role in the maintenance of diversity in grasslands, the toxic food web involving the six-spot burnet moth (*Zygaena filipendulae* (Linnaeus, 1758); Figure 3) and its host plant bird's foot trefoil (*Lotus corniculatus* L.) and the structure of pin and thrum flowers on common primroses (*Primula vulgaris* L.) and how this facilitates outcrossing and thus genetic diversity. This zone of the garden also provides a focus for research, teaching and public-facing wildlife monitoring activities, such as bioblitzes.

The Nature Discovery Garden extends the previous Wildlife Garden, creating larger and better-connected areas of urban UK habitats that will be familiar to many of our national visitors. A new flower-rich native grassland has been created along the western front of the Waterhouse Building, greening an area that was previously dominated by impermeable pathways and low-diversity amenity lawn. With a substrate of nutrient-rich soil that has been reclaimed from other areas of the site, this space will be used to demonstrate how active management can reduce soil fertility and increase floristic diversity, and the wider biodiversity benefits of these practices.

Clear sight lines were designed to encourage further exploration of the space, with an accessible pathway running between this grassland and a corridor of native shrubs to a new pond network. As a conservation case study, we retained the existing pond contents onsite in temporary holding ponds, including macroinvertebrates and a subsample of plants, water, sediment and contained microbial life. These were translocated back into the new pond following build, ensuring continuity. The pond system already represents a thriving aquatic environment, with a rich submerged and emergent flora, much of which germinated from the retained sediment seed bank, including curly pondweed (*Potamogeton crispus* L.). A key feature of the Nature Discovery Garden is a sunken pathway that divides the pond into two (Figure 4), encouraging visitors—young and old—to observe pond life at eye level, whilst providing a safe space from which school groups can pond dip.

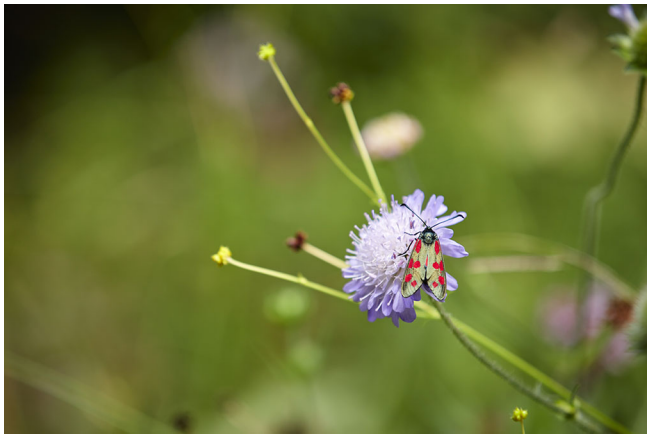

FIGURE 3 The six-spot burnet moth (*Zygaena filipendulae* [Linnaeus, 1758]), here shown feeding on field scabious (*Knautia arvensis* [L.] Coult.), frequents the flower-rich grassland habitats of the Nature Discovery Garden. (c) Natural History Museum London. Reproduced with permission of the Trustees of the Natural History Museum.

Adjacent to the pond network are areas of established chalk grassland (Figure 3), lowland meadow and native deciduous woodland. Planted in 1994, these represent the core of the previous Wildlife Garden, and here our efforts have focused on light-touch changes aimed at building habitat connectivity. Natural swales have also been embedded throughout to maximise water retention and create opportunities for moisture-loving plants.

The Nature Discovery Garden supports an expanded school education offer. Designed alongside the garden layout to create an immersive learning experience where nature is the main teaching tool, this includes explorations of pond and terrestrial insect life. Facilitated sessions comprise field-based investigations aimed at building age-appropriate environmental awareness and action, and modelling solutions-focused outdoor science. Students learn about classification, biological indicators, water quality and methods used in ecological monitoring, rooted in the Museum's scientific research. Schools can also explore independently using free, downloadable self-guided trails.

4.4 | Looking to the future

An outdoor classroom and new teaching hub separate the UK-focused habitats of the Nature Discovery Garden from an interpretative zone that encourages visitors to consider the future of urban planting in a climate-warming scenario. Originally a biodiversity-poor paved courtyard, we have de-paved as much of this space as feasible. Plants in this area are an eclectic selection of herbaceous species and trees that are suited to the warming climate of urban spaces in London. The space has a decidedly Mediterranean feel, with lavender (*Lavendula stoechas* L.), rock roses (*Cistus albidus* L., *Cistus monspeliensis* L.), stone pines (*Pinus pinea* L.) and cork oaks (*Quercus suber* L.). Small, de-paved areas throughout this zone have been left as experiments in natural recolonisation, while community planters co-created with local communities in less prosperous areas of the local borough reflect the huge diversity of cultural links with plants and highlight the key role plants play for people everywhere. The creation of the planters involved exploration of the centrality of plants for the lives of many peoples, and the plants featured were selected by local community members (https://www.nhm.ac.uk/discover/people-and-plants.html).

5 | NOT JUST A GARDEN

Central to the philosophy of the garden designs is a living laboratory where researchers can study urban nature and the environment, as well as train new generations of nature enthusiasts and researchers. A new Nature Activity Centre is a focus for school and adult education, including a Nature Lab for use by university students and researchers when studying biodiversity in the garden. Long-term studies such as visual surveys of key species groups and eDNA (environmental DNA)

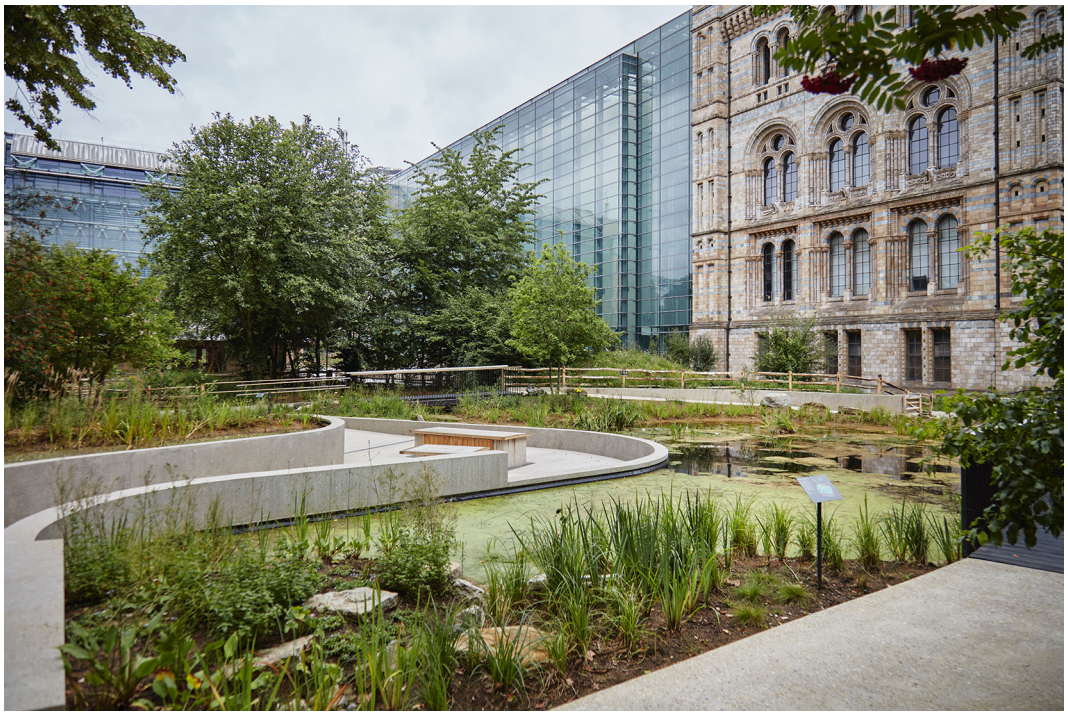

FIGURE 4 A pond network set amongst an extended wildlife garden includes a sunken pathway that enables visitors to view pondlife at eye-level. Aquatic plants include curly pondweed (*Potamogeton crispus* L.), white water-lily (*Nymphaea alba* L.) and water plantain (*Alisma plantago-aquatica* L.). (c) Natural History Museum London. Reproduced with permission of the Trustees of the Natural History Museum.

monitoring of aerial, soil and aquatic environments, along fixed habitat and environmental gradients within the site, are already underway. This activity is supported by public-facing biological recording events, including bioblitzes.

Collectively, this 'Urban Research Station' will become a long-term study site focused on urban biodiversity and environmental change, and a space in which new methods and tools for biodiversity monitoring can be tested against a well-known flora and fauna. Research studies—for example, investigating the whole-community impacts of conservation management—are carried out within a public-facing environment. Visitors ask questions about our work, providing an informal route to communicate the science of nature recovery and inspire closer examination of nature itself. As a model high-footfall urban study site, this provides an opportunity for research targeted at better understanding urban nature; ultimately generating data that can be used to drive improvements to the wider urban landscape.

A network of ducting beneath the gardens contains power and data networks, as the basis of a garden-wide sensor grid. This activates a network of fixed points at which digital technology can be mounted, for example, microphones, cameras and environmental sensors (Figure 5).

One technology that has shown immense promise in monitoring some taxonomic groups is acoustics at either the species (bioacoustics) or landscape (ecoacoustics) scale. The redevelopment of the gardens has allowed large-scale and continuous collection of acoustic data across the site, including environments that are only beginning to have their acoustics studied, such as freshwater, soil and inside trees. The Museum has had research interests in bioacoustics since the 1950s and has recently digitised its collection (Baker et al., 2015). This collection of sounds, particularly strong in the European Orthoptera and often directly linked to preserved specimens, can now be used in developing machine learning models to identify and monitor species in the gardens, including where insects are associated with plant species through geolocation.

The installation of networked Raspberry Pi computers to enable acoustic monitoring also opens new possibilities in environment monitoring, allowing abiotic factors such as temperature, light levels and humidity to be monitored at the micro-habitat scale. These measurements provide vital context for biodiversity surveys and enable a new generation of environmental monitoring across the site, including the development of digital twins for key environments such as ponds and grasslands.

The network and power infrastructure throughout the grounds allows permanent deployment of research ideas that were previously only tested or deployed for short periods in the gardens, e.g. for abiotic monitoring (Baker, 2014) or species detection (Bennett et al., 2015). The adoption of standard technologies (Power-over-Ethernet, Raspberry Pi, Linux) means that the network can be used with a wide range of current (and future) sensors.

These re-developed gardens are a research platform open to other researchers, not just those at the Museum. The garden provides not only a physical venue and connectivity for novel software and hardware development but also a long history of confirmed biological records against which to measure change.

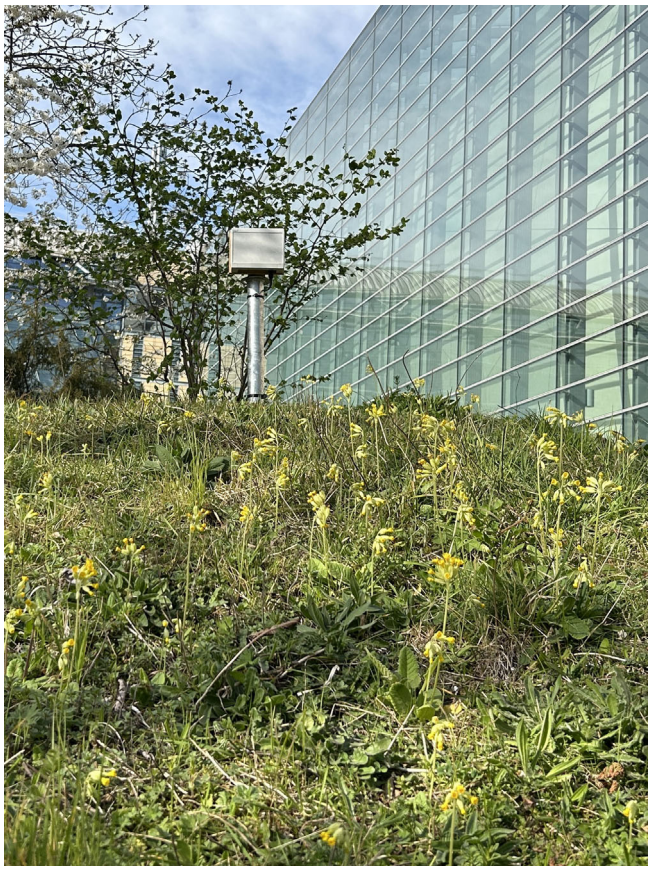

FIGURE 5 An environmental and acoustic sensor on top of a mound of chalk wildflower grassland. The grassland has been retained from the previous Wildlife Garden, and is rich in wildflowers, including these early spring-flowering *Primula* species. Photograph S. Knapp.

The increasing flow of different types of data creates new requirements for synthesis and analysis. A Data Ecosystem capable of ingesting these diverse types of data and allowing them to be analysed using both automated pipelines for standard analyses and via research virtual environments for curiosity-driven research is essential. The network connectivity across the site facilitates real-time digital interpretation for public audiences, enabling demonstration of the impact of vegetation on cooling, noise and UV filtering at a small spatial scale as part of a wide and immersive visitor experience.

6 | PART OF A MOVEMENT

The need to utilise outdoor space has been recognised by several large natural history museums, and these spaces inspire parts of our work in London. The National Museum of Natural History (Smithsonian) features a collection of gardens that tell various stories, including the story of plant evolution in the Pioneering Plants garden, and promotes urban biodiversity through their Urban Bird Habitat. The Sukinanik'oy Garden at the Santa Barbara Museum of Natural History displays plants of cultural importance to the native Chumash people. The Natural History Museums of Los Angeles County have a long-running rewilding project in their gardens and an established Urban Nature Research Center.

Closer to London, National Museums Scotland is undertaking rewilding of land around their Collections Centre, and closer still the Horniman Museum's Nature + Love project sets out to transform the use of their green space.

Our Earth Systems and evolutionary approach has allowed us to unite the Evolution Garden with the stories revealed through our Life Science and Earth Science collections. The Nature Discovery Garden has allowed an equally powerful connection to be made with our current research on urban diversity. Our investigations into how we can create urban spaces where both people and nature can thrive are conducted in full view of the local communities of which we are part, in a garden they helped to co-create.

The gardens these institutions have created may seem distinct from the traditional botanic garden, but we argue that they are best

TABLE 1 Selected data from 804 visitor surveys completed between July and November 2024 (NHM, 2025). These initial data show that visitor experience within the gardens has been highly positive. Supporting data indicate areas in which we may look to adapt our interpretative approach, for example, by adding additional information on conservation research within the gardens, and practical measures that visitors can take to support nature after their visit. The wider study included qualitative data from 111 in-depth interviews, focus groups and observed visits. Complete data can be accessed in NHM (2025).

Question/topic	Strength of net agreement (net positive response)
1. Overall visitor experience	
Overall enjoyment of the gardens	94%
The gardens enhance the experience of visiting	95%
The gardens provide opportunity to actively engage with nature	88%
2. Extent to which the gardens successfully communicated key themes	
Life evolves in response to the changing Earth	84%
All living things, including humans, are connected and shaped by each other and the environment	90%
We are all part of life on Earth, together we can make changes to protect it	89%
3. Impacts of Nature Discovery Garden on nature connection and behaviours	
Made you want to spend [further] time in a natural space	92%
Made you more likely to take action to protect the natural world	76%
Made you want to do something to support nature in your own community	77%

seen as an emerging subset, still curated for education and research, but telling different stories and answering different questions.

It is apparent that similar institutions have undertaken, or are embarking on, similar journeys to transform their outdoor spaces and associated educational and research facilities. Perhaps it is time to form a community of practice to share our findings and together create a new generation of gardens as outdoor galleries and learning spaces in city centres, bringing natural history to everyone.

7 | CONCLUSIONS

Our experience with creating a garden that features living plants in context as integral parts of the diversity of life on Earth, past and present, has allowed us to not only show plants in an integrated and positive light, but also to access audiences who may not have come to see them, but do.

Space for nature – and for people and nature to interact – is at a premium in urban settings, and there remains a large-scale inequity in access to the services that it provides. As a cultural body and collections-based research institution, we asked "how could we maximise the benefits of our outdoor space for nature and people"? We ultimately arrived at an Earth Systems approach to the redevelopment of our gardens. A nature-led narrative tells the story of terrestrial life, from its early origins and evolution to the current human-driven crisis. It encourages our visitors to explore and think about change through time, their relationship with nature and the potential role(s) they can play in driving positive change. Plants are central throughout this narrative and within the associated research and educational programmes.

As for many high footfall locations, our gardens need to perform multiple functions. Finding the balance between practical needs and the imperatives to a) visibly help nature recover and b) drive wider evidence-led environmental action has proven to be highly challenging. Initial visitor evaluation is promising, though, as well as hinting at areas where we may look to further improve our interpretative approach (Table 1).

Time will tell how our gardens habitats and associated research develop and whether they can continue to catalyse and inform urban greening initiatives in the local area and beyond. What is already clear is that this programme has provided a renewed impetus to nature recovery research and nature education within our institution, as well as inspiring ongoing conversation about how we can collectively plant diversity-rich, green outdoor spaces at cultural organisations.

AUTHOR CONTRIBUTIONS

Ed Baker, Paul Kenrick, Sandra Knapp, Tom McCarter and John Tweddle contributed to conceiving, writing and editing this opinion paper.

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CONFLICT OF INTEREST STATEMENT

Sandra Knapp is a strategic advisor to Plants, People, Planet. The authors declare no other conflicts of interest.

DATA AVAILABILITY STATEMENT

All cited data are openly available through the NHM Data Portal (https://data.nhm.ac.uk) or the National Biodiversity Network Atlas (https://nbnatlas.org).

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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