

# Landscapes of the four Gardens

## The Edinburgh Biomes in 2021

Fiona Inches & Sadie Barber

The Edinburgh Biomes is one of the largest landscape development projects undertaken by RBGE since its relocation in 1820 from the Leith Walk site to its new home at Inverleith. It involves the construction of an energy centre that will eventually provide heat and electricity to all the buildings in the Edinburgh Garden; a state-of-the-art Plant Health Suite to regulate plant imports and diagnose plant pests and diseases; renovation of the two Victorian Palm Houses and the 1960s Front Range Glasshouses; replacement of the research glasshouses and the horticultural buildings and offices; and the creation of a 21st-century glasshouse which will become the new main entrance to the public glasshouses.

The project has been in the planning for many years, and in autumn 2019 RBGE staff started to move plants growing outside the glasshouses that will be affected by construction work. The first phase of this seven-year project began in April 2021. By the September, 2,756 of the 8,645 individual plants growing outside had been moved. The others will be moved or removed over the next four years as the construction programme progresses.

In January 2021 staff started moving the plants located inside the glasshouses to the areas where they will be looked after for the duration of the project. Six additional staff were taken on in April 2021 for one year to help with the monumental task of moving the 2,824 accessions in the public glasshouse collections. Prior to 2021 each accession was reviewed, and in some cases difficult decisions had to be made. The review posed a series of questions to inform these decisions:

1. Are there already pot-grown plants in the back-up collections?
2. If not, can the accession be propagated and/or containerised and moved?
3. If not, are other accessions of the taxon available and are they wild-collected?

In each case, resources are directed to wild-collected material over garden-origin plants or species which can be relatively easily replaced.

Several collections have been moved to a glasshouse built on the Nursery to the north of the main garden. Research and back-up collections of *Begonia*, and both tropical and temperate orchids, Cactaceae, *Pelargonium*, Coniferae and Ericaceae have all been relocated in 2021.

The biggest challenge in this first phase of the project is dealing with the enormous (up to 8.5 m) and historical collections of palm species. The grade A-listed Palm Houses will be completely renovated, which means that all plants have to be removed. Some are sadly just too big to lift and so will be de-accessioned; others have been carefully dug up and transported, using specialist equipment hired for the purpose and with many staff on hand, to be potted into 1,400-litre Air-Pots® on pallets in their temporary home in the Temperate House in the Front Range. Some, such as *Rhopalostylis sapida* and *Archontophoenix alexandrae*, conveniently had seedlings growing at their bases; these have been collected, given new accession numbers and potted up.

The last plant to leave the Tropical Palm House will be the mature *Sabal bermudana*, a plant that was brought from the Leith Walk site in 1820. It has no more room to grow in its current location, and everything possible has been done to maintain its health in recent decades (Elliott & Mullany, 2013). It is a sad loss but it was propagated in 2016, and these propagules will be planted out in due course.

### Reference

ELLIOTT, A. & MULLANY, P. (2013). *Sabal bermudana* L.H. Bailey (The Sabal Palm). *Sibbaldia*, 11: 61–70. doi: <https://doi.org/10.24823/Sibbaldia.2013.51>



**Fig. 1** The largest palm to be moved from the Temperate Palm House to a temporary home was *Livistona humilis*. It took several days of digging, wrapping, hiring specialist equipment, and coordinating people and machinery to get it into a 1,400-litre pot in the Temperate House in the Front Range. Photo: Lynsey Wilson.

## Edinburgh: An Experimental Raingarden

David A. Kelly, Kirsty Wilson, Aravindan Kalaichelvam & David Knott

*This piece has been extracted from an article first published by Kelly et al. (2020).*

An experimental raingarden was created at the Edinburgh Garden in 2019 to help cope with the impacts of more frequent and intense rainfall events. Raingardens offer a sustainable, nature-based solution to flood mitigation by mimicking natural rainwater retention and infiltration characteristics within a constructed bioretention system. The area chosen to establish this first raingarden for RBGE was one that had flooded frequently in increasingly common periods of heavy rainfall.

Researchers from Heriot-Watt University in Edinburgh carried out studies into the filtration capacity of the soil. Following the analysis of (1) how quickly water drained through the soil, and (2) the components of the existing soil, structural amelioration was carried out. Some of the existing soil was dug out and mixed with compost made on site, sand and gravel to a specified range of particle sizes and proportions. The composition of the soil was developed to ensure better filtration, as well as providing sufficient organic material and nutrients to support the plants. Then plant species that can withstand both very wet and very dry conditions were selected.

Another purpose of this raingarden was to provide enhanced biodiversity capacity. The mix of plants chosen encourages a diversity of wildlife, providing nectar sources for insects and bees in summer,

and homes for invertebrates and food for seed-eating birds in winter. The planting includes both Scottish native and non-native plants. There are strong ethical and ecological reasons why native plants are the first choice, but the use of non-natives can be just as effective in this environment. RBGE has a remit to enhance biodiversity and displays plants from around the world. This global perspective is an important part of its mission. The selected native plants include *Saxifraga granulata*, *Succisa pratensis*, *Anthyllis vulneraria*, *Filipendula ulmaria*, *Cicerbita alpina*, *Knautia arvensis* and *Festuca altissima*. The non-native plants include *Aruncus gombalanus* (China), *Ligularia fischeri* (E Asia), *Aquilegia formosa* (western N America), *Primula poissonii* (China) and *Hosta sieboldiana* (Japan). All were grown from seed at the RBGE Nursery.

Over the year following its completion, the raingarden has been shown to attract insects and bees that enjoy the nectar from its flowers, and other wildlife given shelter from its growing canopy. The area has also remained accessible even at times of high rainfall and it has not flooded.

### Reference

KELLY, D.A., WILSON, K., KALAICHELVAM, A. & KNOTT, D. (2020). Hydrological and planting design of an experimental raingarden at the Royal Botanic Garden Edinburgh. *Sibbaldia*, 19: 69–84. doi: <https://doi.org/10.24823/Sibbaldia.2020.298>

## Engaging Gardens

Jenny Foulkes

Engaging Gardens is RBGE's community engagement programme. It includes the Edible Gardening Project, the Kitchen Garden, health and wellbeing activities, and our skills share work. Activities are largely, but not exclusively, based in the Demonstration Garden. The programme is supported by players of People's Postcode Lottery.

The mission of Engaging Gardens is to ensure that everyone can access and benefit from the health, wellbeing and learning opportunities that RBGE's Gardens, collections and expertise offer, connecting health and wellbeing, environmental sustainability, people and plants. For more information, see Foulkes (2017).

### Edible Gardening Project

The Edible Gardening Project shares horticultural knowledge, skills and enthusiasm for growing food with diverse communities to help connect people with the plants that nourish us.

RBGE community gardeners and a team of dedicated volunteers run events and 'Meet the gardener' sessions, as well as maintaining demonstration plots. Community groups visit the Demonstration Garden and work alongside the team to develop their skills and maintain their own plots. During the Covid-19 pandemic, engagement work moved online, but over the course of 2021 groups have gradually been welcomed back on site.

### Kitchen Garden

The Kitchen Garden is supported by Heritage Portfolio, which manages RBGE's café and restaurant. Seasonal produce is grown

in the Demonstration Garden, and regular deliveries are made throughout the year directly to the kitchens, ensuring that visitors can enjoy Garden-grown produce. High-value crops such as baby salad leaves, herbs and edible flowers are cultivated so we can make a big impact with limited space. The Kitchen Garden areas are currently undergoing conversion and assessment to become organically certified spaces.

### Health and Wellbeing

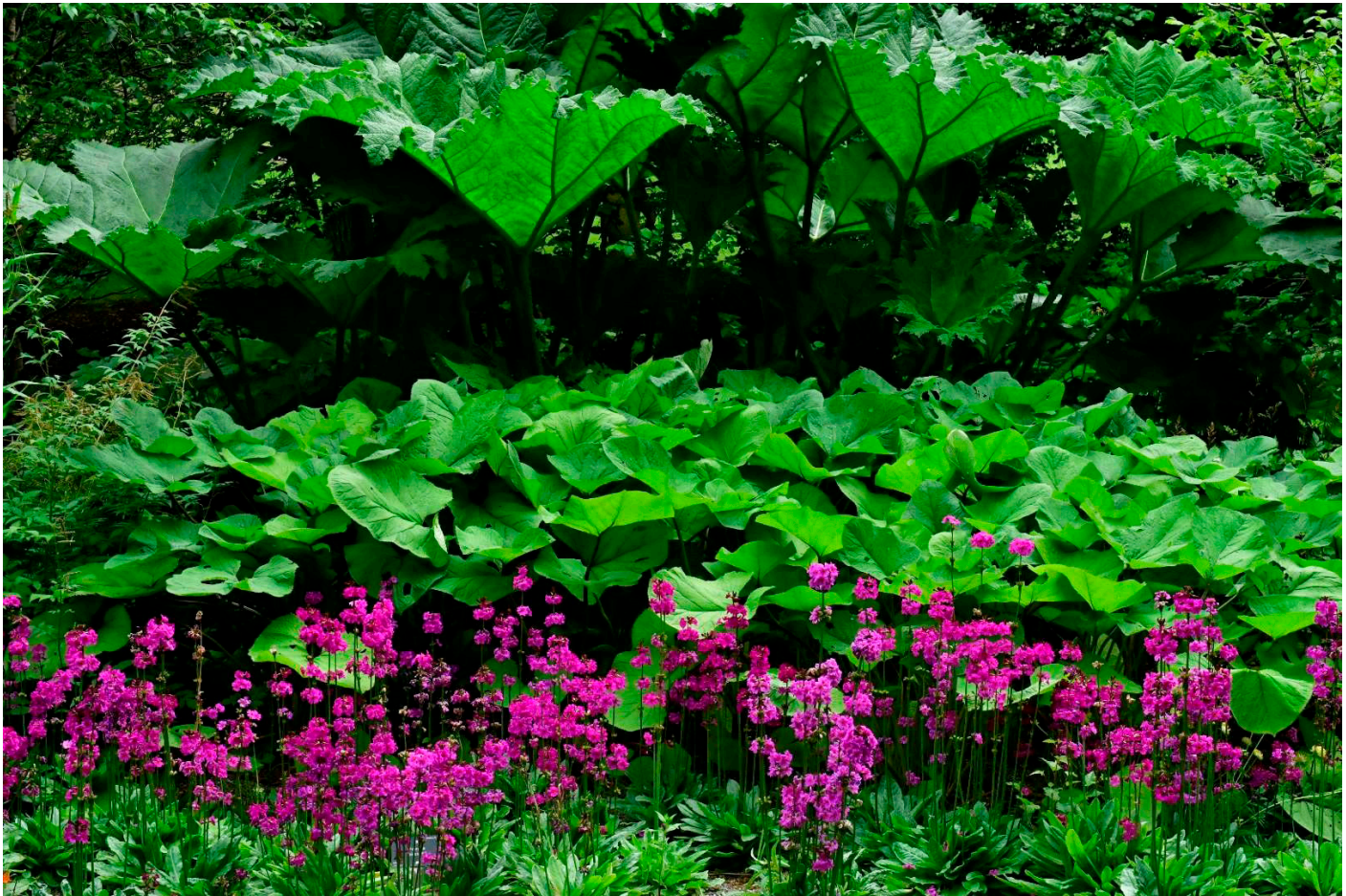
The connection between health, wellbeing and the environment is well known and became more pronounced in 2020. The year 2021 has seen the reintroduction of activities to help people gain even more from the Garden and the beautiful greenspace that it offers, including garden socials, a cook club, yoga, art activities and a book club.

### Skills Share

Community engagement activities are not confined to the Garden; the team also offers support to local groups at their own sites. We work closely with groups and deliver workshops including fruit tree pruning, organic pest and disease control, propagation skills and how to grow winter crops.

### Reference

FOULKES, J. (2017). The value of community engagement in botanic gardens with examples from the Royal Botanic Garden Edinburgh. *Sibbaldia*, 15: 121–128. doi: <https://doi.org/10.24823/Sibbaldia.2017.227>



**Fig. 2** Layers of planting in the raingarden. Photo: Kirsty Wilson.



**Fig. 3** The fruit-growing area of the Demonstration Garden. Photo: Louise King.

## The Alpine House

John Mitchell

After nearly 13 years of planning, the new Alpine House was built at the Edinburgh Garden and opened in 2012. It is located in the same part of the Garden, just to the west of the traditional Alpine House. Its aim is to show visitors a modern way to grow and show alpines. The main growing area is a wall of tufa about 4 m high which provides the ideal conditions for the species cultivated and mimics their natural habitat.

The house itself is a metal structure with a glass roof which imitates the snow cover the plants would experience in the wild in winter, and keeps them dry during that season, with the roof also allowing rainwater to be collected which is then used for watering the plants. The glass roof incorporates a large wing protecting an area of tufa on the outside which provides an additional different habitat to grow species that need a bit of extra protection from winter rain but will tolerate outside temperatures.

The landscape around the house is planted with species that can survive outside all year round. To the west of the new house, a crevice garden has been built as another demonstration of growing techniques which provide the drainage and light required by alpine species. The slopes are created using limestone which forms crevices in which the plants are established. Above the crevice garden is a bulb meadow where bulbous species and other perennials that grow on grassy slopes can be shown.

In early spring the tufa wall is a riot of colour with the flowers of *Primula allionii*, *Daphne petraea*, *Draba* spp., saxifrages and *Dionysia* spp. Later in the season *Physoplexis* spp., *Campanula* spp. and *Corallodiscus* spp. flower profusely. The new Alpine House sits next to the refurbished traditional Alpine House and visitors can see and compare the wide range of techniques used to grow the plants as well as appreciating the variety and beauty of species that occur in alpine habitats.



Fig. 4 The new Alpine House. Photo: John Mitchell.

## Dawyck Botanic Garden

Graham Stewart

Living collections of both Scottish native and international species on display at Dawyck have expanded greatly in the last ten years, reflecting the local and international nature of RBGE's work.

Key plantings of native species include *Cicerbita alpina* (alpine blue sow-thistle), one of Scotland's rarest flowers. In 2013 Dawyck was selected as an *ex situ* safe site for a number of species that were propagated as part of the Glen Clova willow recovery programme. Plantings of *Salix lanata*, *S. lapponum*, *S. myrsinites*, *S. herbaceae* and *S. reticulata* are a further safeguard to the work of the project.

The location of the plant groupings in a small amphitheatre against the eastern boundary does a splendid job of creating a small-scale echo of the willows' natural habitat in Corrie Sharroch within the Cairngorms

National Park, a location which has long since been considered one of the finest examples of a glacial corrie in the British Isles.

While Dawyck is renowned for its continental climate with cold winters and warm summers where only the hardiest survive, recent acquisitions into the collections of more temperate species are of interest. Perhaps as a result of shifting climates, a specimen of *Sequoia sempervirens* (coastal redwood) planted in 2014 during a visit by HRH The Princess Royal is now showing promise, as are a number of *Austrocedrus chilensis* (Chilean incense cedar).

Other new plant accessions include many under the auspices of the International Conifer Conservation Project, for which Dawyck is a safe site. New accessions of particular interest include *Thuja koraiensis*

(Korean arborvitae), whose status in the wild is severely compromised by habitat loss, a threat that it has in common with many conifers worldwide. Other plantings include *Abies pinsapo* (Spanish fir) and *Picea koyamae* (Koyama's spruce), from the central mountains of Japan, which are also both endangered in their natural habitats.

Important steps have been taken in interpreting the collections for our visitors, with two bespoke tree trails. The Native Tree Trail and the Exotic Tree Trail give visitors to the Garden a flavour of the range of different tree species within these two groupings that have their home at Dawyck.

In 2021 a self-guided trail was introduced to interpret the 'Wee World of Lichens'. If Dawyck is famous for its trees, then its wonderful kingdom of lichens is also worthy of exploration. This trail invites visitors to take a leaflet, follow a marked trail and find out more about the sheer beauty of these amazing and often overlooked miniature organisms.

More general restocking of the plant collections is a yearly task and is often linked to periods of severe weather and associated losses therein, or through natural wastage or removal of moribund specimens. Systematic replanting has been carried out and has seen new acquisitions of *Acer*, *Betula*, *Prunus*, *Sorbus*, *Juniperus* and *Rhododendron* from a number of different RBGE expeditions including DBT, REKET, CBDK, MADDT, EIKJE and EIJE. Work undertaken to bolster Dawyck's significant holdings of Nepalese plant material has also seen the planting of species of *Cotoneaster*, *Berberis* and *Rosa* from BRAW.



**Fig. 5** *Austrocedrus chilensis* planted in 2014 at the Viewpoint and protected from deer damage. Photo: Graham Stewart.

## Logan Botanic Garden

*Richard A. Baines*

The total number of species cultivated at Logan has increased in the last decade by almost 120 per cent, from 972 in the year 2011 to 2,144 in 2021. This increase has been made possible by the development of infrastructure, creating new growing opportunities and collaborative fieldwork.

The most significant development at Logan in recent years has been the construction of a beautiful Victorian Conservatory in 2014 at the heart of the Garden. The Nursery was relocated to the lower yard, where an Isolation House was also built to minimise pest and disease transmission. The Conservatory has transformed the area and enabled Logan to diversify its displays into tender plants from South Africa such as pelargoniums and proteas. It is the first public conservatory in the UK to be powered entirely by green energy, using photovoltaic solar panels and air source heat pumps.

The area to the west of the Conservatory has also been transformed. Shelter plantings have been removed and replaced by a collection of tender rhododendrons in section Maddenia. This has created some new scenic vistas across the Garden which were formerly obscured.

In the Walled Garden, beds have been renovated with a combination of soil amelioration, mulching and new plantings. A new peat wall area has been created to reflect Logan's history, as peat gardening was a passion of the McDouall brothers, the founders of the Garden.



**Fig. 6** *Polyspora speciosa* collected from Phan Xi Pang, a mountain in northern Vietnam, collection number HNE 107. Photo: Richard Baines.

Large areas in the Woodland Garden are now devoted to Vietnamese rhododendrons, magnolias and polysporas, collected on three field trips to north-west Vietnam. These trips have the collection codes HNE, LGCKH and LWCWEI and were undertaken in association with the Institute of Ecology and Biological Resources in Hanoi and international institutions from Canada, England, Wales and the USA. Many of these species exist in the wild as small, fragile populations which are subject

to a number of threats. The collections at Logan provide an opportunity to conserve them.

Reducing carbon and increasing sustainability is a priority at Logan. It was the first garden in Scotland to install electric charge points for

motor vehicles. Additional measures to address climate change include planting at least one new hedge every year for the last eight years and the installation of a new drainage network throughout the woodland area to increase resilience at times of extreme rainfall.

## Benmore Botanic Garden

*Peter Baxter*

Since 2011, the collections at Benmore have undergone many improvements in both the soft and hard landscaping. A number of additions have been made to the infrastructure to enhance the experience for visitors too.

A full 99 per cent of the material planted is now of known wild origin as a result of fieldwork, predominantly from the following trips: NCEE, SEUSA, CDGM, EIKJE, CJLU, DBT, EHER, EHBC, BRAW, BCCG, EHO� and EHS. All five species of *Sorbus arranensis* are now represented in the Garden. Benmore holds National Plant Collections® of the genera *Abies* and *Picea* and of temperate South American conifers.

Plant material has historically been supplied from the Nursery at the Edinburgh Garden. An isolation glasshouse was constructed in 2018, enabling tighter biosecurity and more propagation to be carried out at Benmore than has been done in the past.

A new system of caging against roe deer has been developed to help the establishment of young plant material (Gray, 2017). Plant development is vastly improved as a result.

A number of stone terraces have been added to the Fernery gully,

affording opportunities to plant many more ferns and an important tree and shrub layer. Species planted include *Acer japonicum*, *Phellodendron amurense*, *Polylepis australis*, *Rhus succedanea*, *Sorbus kohneana* and *Zanthoxylum piperitum*.

The Bhutanese Pavillion is of oak construction and is situated midway up the Bhutanese Glade, in a grove of *Larix griffithii* and *Cupressus cashmeriana*. The Chilean Viewpoint Refuge was constructed in 2014. It is situated in a plantation of over 150 trees of *Araucaria araucana*. Other plants in the area are *Blechnum chilense*, *Blepharocalyx cruckshanksii*, *Eucryphia glutinosa*, *Nothofagus dombeyi* and *Ugni molinae*.

The grade A-listed Golden Gates were refurbished in 2012 and the landscaping in the area was redesigned. The climax planting is a small grove of *Sequoiadendron giganteum*. Some of the other planting comprises multiple specimens of *Hydrangea sargentiana*, *Magnolia stellata*, *Pterostyrax hispida*, *Stewartia pseudocamellia* and a number of *Rosa* species.

The shelters, Fernery and Golden Gates have created 'go to' destinations within the Garden and have enhanced the cultural identities of the plantings in the phytogeographic areas. There are now chortens at the



**Fig. 7** The Chilean Refuge and *Araucaria araucana*. Photo: Peter Baxter.

Bhutanese Glade, a large map of Chile in the Chilean Rainforest, three torii gates in the Japanese Valley and silhouettes of wallabies made from Corten steel on the Tasmanian Ridge.

A Fern Trail and Lichen Trail with leaflets have been made for visitors to follow. They provide information about the lifecycles of ferns and lichens and encourage visitors to look more closely at these groups.

In 2021, a programme of geo injection, air lancing and mulching has been taking place to alleviate compaction and improve drainage along the length of the Redwood Avenue which was planted in 1863.

Increasing rainfall in recent decades has compacted the soil at the roots of these trees and is affecting their health. Since records began in 1931, Benmore experienced its hottest day on 28 June 2018, with a temperature of 30.9 °C, and its wettest day on 18 November 2012, with 125 mm of rainfall. These figures are indicative of climate change and we are seeing the effect of this on the living collections.

**Reference**

GRAY, D. (2017). Deer damage to woody plants – the Benmore solution. *Sibbaldia*, 15: 109–121. doi: <https://doi.org/10.24823/Sibbaldia.2017.226>



**Fig. 8** The Fernery. Photo: Rachel Keenan.