

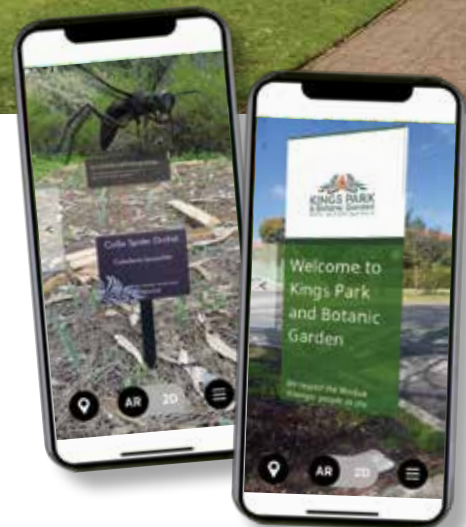


Augmented exploration

Exciting technologies such as 'augmented reality' provide new opportunities by combining the natural world with the virtual world. Through engaging visitor experiences, botanic gardens play an important role in connecting people with nature while educating on biodiversity and conservation.

by **Dr Laura Skates**
and **Emily Denham**





Augmented reality, or the merging of the real world with the virtual world, has come a long way since the first hardware was developed in 1968. With smart devices often on hand, augmented reality apps are an excellent modern storytelling choice for a tourist destination, with the ability to overlay digital media to points of interest through GPS technology.

The technology has been recognised as a next step in visitor experiences in botanical gardens across the world, providing the opportunity to enrich the visitor's knowledge of flora, culture and history in an engaging and immersive way. Visitors are taken on a journey through the gardens to learn the stories of landmarks, areas of cultural significance and flora of interest.

“The stories shared through *Markr* in the Conservation Garden celebrate Kings Park's efforts in conserving and restoring WA's environmental treasures”.

In Western Australia, visitors to Kings Park and Botanic Garden can explore some of Western Australia's rarest and most threatened flora through an augmented reality experience using the newly developed, free *Markr* app. Users can discover behind-the-scenes stories of plants growing in the park's Conservation Garden.

Kings Park's Conservation Garden is a safe haven for around 400 of WA's rare and threatened plant species. These plants are grouped according to region or type of country, from granite outcrops, to sand plains, and arid zones. Few people have the opportunity to see these plants growing in the wild, so this garden provides a unique experience for visitors.

The stories shared through *Markr* in the Conservation Garden celebrate Kings Park's efforts in conserving and restoring WA's environmental treasures. An introductory *Markr* describes how plants are conserved behind-the-scenes, from seed banking to tissue culture and cryopreservation.

From tiny seeds and plant tissues, the horticulture team at Kings Park propagate threatened plants for display in the gardens and also for translocation into the wild in collaboration with other staff in the Department of Biodiversity, Conservation and Attractions (DBCA).

MARKR APP

The *Markr* app was created in Perth by a team of local entrepreneurs, as an innovative way to explore and learn about the world. The augmented reality signs fit in the palm of your hand and pop up on your phone as you get closer to the featured plants in the Conservation Garden. With in-built text translation services, visitors can read the digital signage in the language set in their mobile devices, increasing accessibility for multicultural audiences.

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Top The 3D pollinator is a fascinating feature on the *Markr* app.

Photo – Markr Systems

Below Using the *Markr* app.

Photo – Andy Milner/DBCA

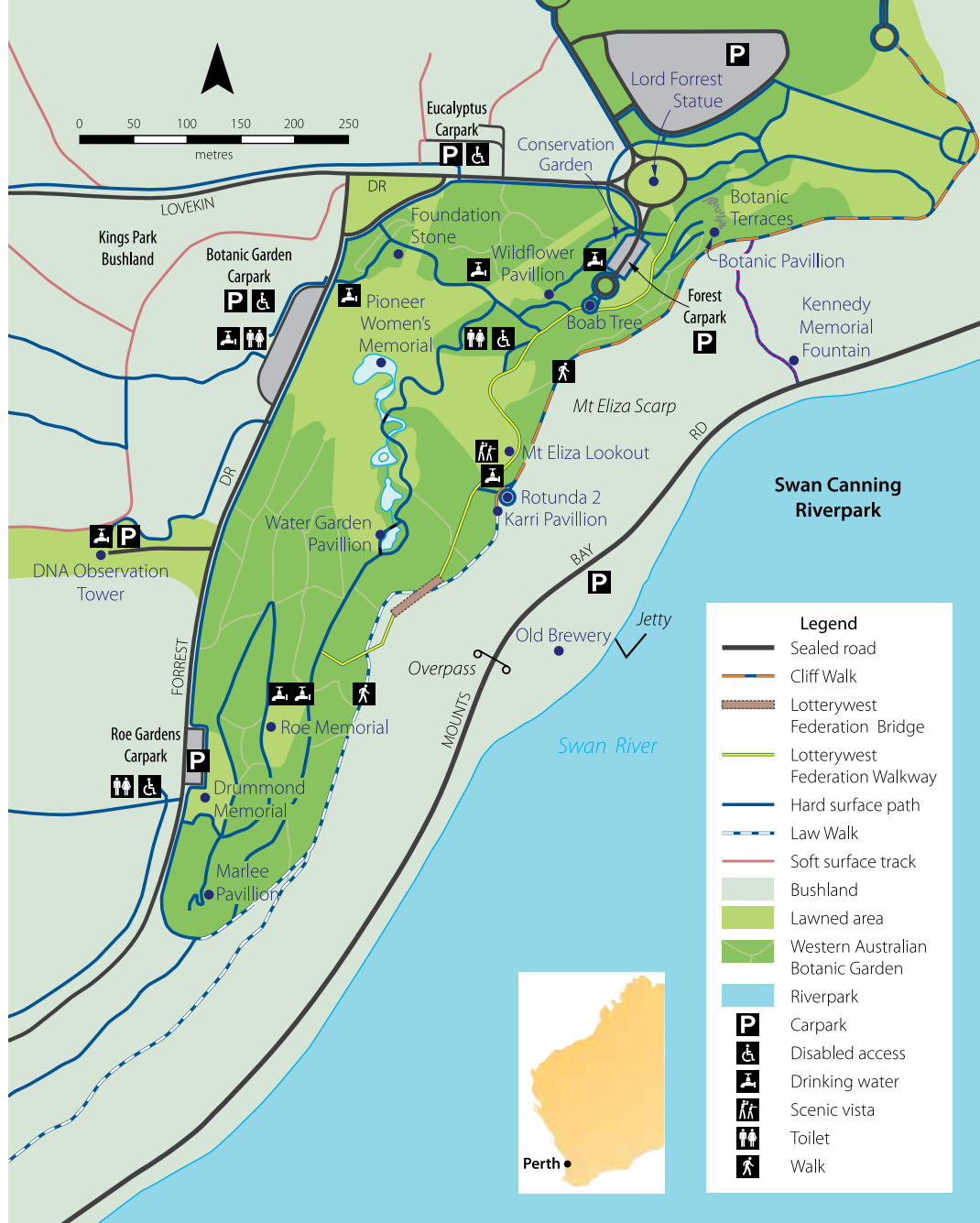
Above Conservation Garden, Kings Park.

Photo – Jiri Lochman

Above right Fraser Avenue, Kings Park.

Photo – Marie Lochman

Inset left and right Snapshots from the *Markr* app.



FOUR PLANTS

Four plants have been profiled across the Conservation Garden with virtual signage appearing on mobile devices alongside the physical plants. Starting at the entrance near the roundabout, you'll find a *Markr* celebrating the diversity of *Darwinia* (mountain bell) species on display and sharing some of the key threats facing the mountain bells in the Stirling Range.

As you explore further into the Conservation Garden, you'll spot the purple flowered *Tetradthea aphylla* (pink eyes) with a matching virtual sign. This *Markr* shows the natural rocky habitat of

a related species *Tetradthea erubescens* and shares stories of scientific research to restore this plant in the wild. These plants are 'born to rock', growing straight out of banded ironstone with their roots winding through narrow cracks in the search for life-sustaining water and nutrients. If the plant isn't in flower at the time you visit, the *Markr* app will also show you a 3D virtual flower that can be zoomed in on and spun around to see how the flower looks from every angle.

Not far from there, you'll find a relatively recent addition to the Conservation Garden—the Collie spider orchid (*Caladenia leucoxchila*). Discovered

in 2008, the Collie spider orchid is known from approximately 800 individuals in a very restricted area and has seen a significant increase in population through conservation work conducted by DBCA scientists including Kings Park Science orchid expert Dr Belinda Davis. In 2021, the Collie spider orchid was planted into the Conservation Garden to be enjoyed by all.

Top left QR codes can be scanned to download the *Markr* app.
Photo – Jiri Lochman

Above left Conservation Garden, Kings Park.
Photo – Marie Lochman



Above Pink eyes (*Tetratheca aphylla*).
Photo – Emily Denham



Above right Collie spider orchid (*Caladenia leucochila*).

Right Silky eremophila (*Eremophila nivea*).
Photos – Andrew Brown



Far right This *Markr* sign encourages native gardening at home.
Photo – Emily Denham



“People love WA’s unique orchids for their diverse and beautiful flowers and their quirky interactions with fungi and pollinators,” Dr Belinda Davis said.

“The Collie spider orchid provides the perfect vehicle to engage the public in understanding the conservation challenges faced by WA’s flora and tell stories about the considerable research effort that goes into protecting it,” she said.

“The orchid was chosen for the *Markr* app to help educate people about the ecology of the species and how their actions can contribute to conservation. The Collie spider orchid was also the first

orchid species to be put on display in the Conservation Garden, and its planting provided a prime opportunity to engage the park’s visitors with the *Markr* project.”

The *Markr* app shows what the tiny dust-like orchid seeds look like up-close and features a virtual 3D wasp pollinator.

“I think the virtual 3D pollinator is amazing,” Dr Davis said. “I love being able to zoom in and see the detail.”

“The wasp has only recently been named and is very difficult to see in the wild, so it is great to share the experience of seeing this thynnid wasp up close.”

Last on the trail, if you are familiar with native gardens in Western Australia, you might be surprised to spot the silky eremophila (*Eremophila nivea*) near the western-most entrance of the Conservation Garden.

The soft silver foliage and purple flowers make it a popular garden plant, but unfortunately this beautiful shrub is critically endangered in the wild.

The *Markr* signage explains the important role that gardeners can play in conserving native plant species, and also links to the Friends of Kings Park website



United Nations Decade on Ecosystem Restoration

The stories shared through the *Markr* app are of particular importance now, during the United Nations Decade on Ecosystem Restoration (2021-2030), which the Botanic Gardens and Parks Authority signed on to last year. The aim of this UN Decade is to prevent, halt and reverse the degradation of ecosystems on every continent and in every ocean.

Kings Park is uniquely placed to be part of the solution. A special issue of the Friends of Kings Park's *For People and Plants* magazine showcases Kings Park's involvement in ecosystem restoration within Kings Park and Bold Park, and other delicate and fragile ecosystems across Western Australia. You can read these stories online at friendsofkingspark.com.au/un-decade-on-restoration

where you can purchase native plants for your home garden.

AR WORLDWIDE

The opportunities presented by augmented reality are being explored across Australia and the globe.

The Royal Botanic Gardens in Victoria are currently utilising augmented reality in an exhibition called 'Seeing the Invisible'. Through a custom-made app, visitors can view artworks addressing themes of nature, the environment and sustainability. This exhibition is on display in 12 botanic gardens in six countries, including USA, the United Kingdom, Canada, Israel and South Africa.

Local Australian councils have also seen the benefits of engaging ratepayers with green spaces. The *Magical Parks* app transforms parks into fantasy spaces with educational games for children promoting a gentle message of conservation.

In Kings Park, the augmented reality journey has only just begun. Bringing together the wonder of discovery, rich educational content and visitor experience, augmented reality will continue to add another layer to Perth's number one tourist destination.

PLUG IN

While opportunities to 'unplug' are still vitally important in Kings Park, virtual experiences like this can create new opportunities for engagement with native flora and foster an appreciation for the substantial work that goes on behind the scenes to conserve and restore Western Australia's precious biodiversity.

SHARING THE STORIES

There are other *Markr* augmented locations in the park, including the State War Memorial and the Tobruk Memorial precinct on May Drive, that provide information about existing memorials and about new memorial projects commemorating the Korean War and the Battle of Crete. More augmented reality experiences are being considered for the future.

While you're exploring the augmented reality stories, spend some time enjoying all the spectacular species on show and be sure to share your photos online using the hashtag #kingsparkandbotanicgarden and consider planting native flora in your backyard for the protection of native species.

Above left Silky eremophila (*Eremophila nivea*).

Photo – Andrew Brown

Above Gillam's Bell (*Darwinia oxylepis*).

Photo – Jiri Lochman

Below Other *Markr* locations include the State War Memorial.

Photo – Emily Denham



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The *Markr* app can be downloaded for free from Google Play or the Apple Store.