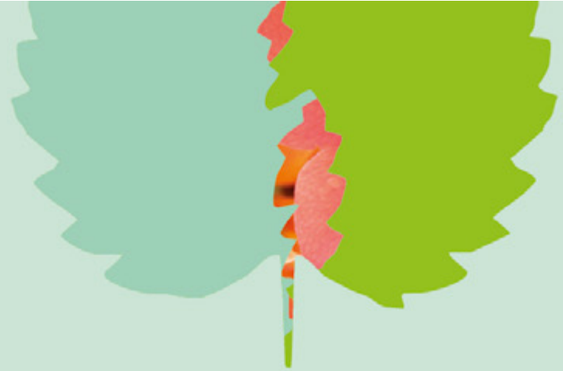


Analysis of current state and identification of critical issues

Inscription on the World Heritage List, in 1997, was a watershed moment, enabling the Garden to launch and firmly establish a wide-ranging conservation programme.

2.1 From the *Hortus cinctus* to the Satellite Garden, a conservation and development journey

By the early twentieth century, the whole area surrounding the Botanical Garden was experiencing widespread building development: the Anselmi machine shop buildings were erected along the eastern boundary of the Site while, on the south side, the 19th-century Pacchierotti grounds — with their impressive lake — were purchased by the Jesuits with the intention of producing a large complex, the Antonianum, essentially designating the areas for educational and sports purposes. In the years after the Second World War, the lake was filled in to build a gymnasium right up against the Garden.

In 1982, when the Anselmi machine shop went under, construction began on new apartment blocks and an underground garage along the western boundary, causing the Garden's water table to drop, with the vegetation only spared from increased water stress thanks to plentiful rainfall in the spring of 1996.

The episode marked the beginning of a public awareness campaign and a trend of opinion that measures should be adopted to protect the Botanical Garden, culminating in public protests and petitions, with the involvement of exponents from the cultural and political world, and with the participation of the local community, students and the national and international scientific community. At the closure of an international convention on "Botanic gardens: past, present and future" (Orti botanici: passato, presente e futuro Padua, 29-30 June 1995) — organized to celebrate the Garden's 450th anniversary — the numerous attendees, both Italian and foreign, unanimously expressed deep concern over the intensification of urban development around the Garden, with the destruction of the neighbouring green belt negating any opportunity to protect the environment and landscape.

Against this background, **inscription on the World Heritage List**, in 1997, was a watershed moment, enabling the Garden to launch and firmly establish a wide-ranging conservation programme.

This was the context behind the University of Padua's request to implement a new project for the Botanical Garden that would involve "purchasing neighbouring areas cleared of existing buildings; restoring the ground's hydrogeological conditions to their original state, including restoring balance to the water table and normal groundwater flow; reinstating a historically faithful landscape with the reconstruction of the orchard, involving the planting of antique varieties no longer grown today. […] […] And so conserving not just the monument, but the neighbouring areas as well,

is of paramount importance for the protection of the Garden." Flowing from this project, a draft bill (proposta di legge C. 5875 Disposizioni per il recupero dell'Orto botanico di Padova) set out provisions for the restoration of the Botanical Garden of Padua and was submitted to the Italian Chamber of Deputies on 7 April 1999 (the above quote is taken from the draft's illustrative paper).

The approval of Italian law Legge 370/1999 — which sets out provisions pertaining to universities and scientific and technological research — and authorization to take out mortgages for the allocated first three billion lira to fund conservation work, marked the start of a new chapter in the history of the Botanical Garden.

The same year, alongside new tools to protect plant species, the Garden put in a watering system designed to continuously monitor the amount of moisture in the soil, with the aim of preventing water stress as a result of fluctuations in the water table (bibliographic reference: Giardini L. & Morari F., *Ecosistema e irrigazione dell'Hortus Patavinus,* Bologna, Pàtron Editore, 2000).

In the meantime, with the possibility of purchasing the adjacent former Anselmi area no longer viable — having been built on in the intervening years — the University approached the Jesuits and set about purchasing the large area of land bordering the Site to the south, which was home to sports facilities having a significant negative impact. With the existing structures demolished and the area reconverted, the University intended to create a buffer belt for the Garden's ancient centre and, at the same time, meet the study needs of botanists, who were lamenting the lack of space to expand the collections and the huge difficulties faced in driving research and educational initiatives, the Garden's founding missions. Establishing a "satellite" Garden, adjacent to the historic complexes, also tied in with the wishes of the community of European botanists (Edinburgh Charter, 1997), who advocated similar solutions to ensure the conservation of the architectural and landscape heritage of botanic gardens without precluding the development of their activities.

Following the direction set, the University called for international tenders, in 2004, for the design of new greenhouses and service spaces to be created on the purchased land. In 2005, the group awarded the contract was asked to come up with a preliminary plan for the restoration work and new structures.

The first outcomes came to fruition in 2008. The circular wall was restored along with the marble balustrade running on top of it, the entrance columns and associated acroteria, the statues, fountains and all wrought iron gates. The following year, work began on the construction of the "satellite" Garden, whose structures were completed

in 2012, paving the way for the installation of the collections of living plants and the creation of the new visitor route through the Biodiversity Garden covering an area of 1.5 hectares. The UNESCO Canal, built along the southern boundary of the ancient Garden — designed to be reminiscent of the original waterway — serves as a demarcation so that visitors can appreciate the separation between the World Heritage Site and the expansion area.

The Biodiversity Garden's new greenhouses, providing insight into the plant world and arranged according to the plants' geographical distribution, were opened to the public in 2014. The main purpose of the move was to expand the plant collections with the introduction of 1,300 new specimens belonging to the Earth's different biomes, from tropical to arid regions. The facility's installation, alongside visitor routes and detailed information on different themes, strengthens the Garden's commitment to conserving plant biodiversity and extends its ability to convey knowledge in the botanic field, with a curatorial design that successfully weaves together botany, the history of medical and pharmaceutical science, and anthropological studies. In parallel with the building of the new greenhouses, a visitor centre and associated ticket office were built and put into operation, along with new scientific research laboratories (which returned home to the Garden after being moved in 1989-1990), temporary exhibition spaces and the auditorium.

The expansion of the "satellite" Garden area was a dual-purpose undertaking: on the one hand, a conservation project for the perpetuation of the values and founding mission that earned the Garden inscription on the World Heritage List in the first place; and on the other, an innovation action with a multi-target approach, both engaging a non-specialist public and developing research and education at a university level.

The "satellite" Garden takes on a complementary role to the Renaissance Garden's botanic narrative and serves a key function in actively sustaining the World Heritage Site and its attributes, preventing additional urbanization of the area. At the same time, it becomes a tool leveraged to manage growing visitor flows, helping make the ancient Garden's visitor cycles less seasonal, thus avoiding overcrowding and meaning there is no need for measures to cap visitor numbers.

With the new facility opening to the public, the decision was made to trial a concession agreement for the running of visitor services to a joint venture. The concessionaire would work alongside the Botanical Garden University Centre, which was established in 2002 and, as of 2007, became the UNESCO Site's contact point for liaison with the Italian Ministry of Culture, remaining tasked with the conservation of its plant heritage and with carrying out scientific research. This evolution would allow the hitherto rudimentary bookshop and booking centre to be properly developed and, above all, meant educational and visitor services could be rationalized and put in place for the whole cultural site.

The trial period of concession to private parties ended in 2016, at which point the University of Padua took on the business risk of running the Garden. The University's organizational structure was adapted accordingly to assist the University Centre through an in-house professional structure specifically established to coordinate and manage services for the Site's enjoyment, communication and cultural promotion, while contracting out visitor services.

Over the period in question, the improvement achieved in the levels of service (booking centre, public surveillance and reception, development of the educational offering and thematic guided tour calendar), along with a focus on communication (web and social media, press relations, image licencing policies and development of brand identity), cultural programmes (exhibitions, installations and events targeting a wide audience) and running of events on a concession basis with its associated specific set of rules, ensured that the Botanical Garden achieved and built on significant outcomes and publicized its status as a World Heritage Site. On the conservation front, restoration work on a number of buildings was completed during the same period, including renovation of the glass house protecting the famous Goethe's Palm (2015) and restoration of the 19th-Century Greenhouses (2018-2019).

While marking a dramatic rift on both a human and social level, the Covid-19 pandemic resulted in only a partial setback in the development of the Botanical Garden's activities.

The ensuing crisis, both economic and financial, has allowed us to identify more clearly certain vulnerabilities and, at the same time, has revealed where the management direction set is strongest. While the almost complete dependence on revenue from admission fees and services has proved to be a risk factor, the combined system of financial support for the Site's action has instead allowed it to weather the impact of an entirely unforeseen situation of massive proportions. Two structural factors came into play in this regard: on the one hand, the protection systems associated with Italian conservation law (*Codice dei Beni Culturali e del Paesaggio*), which, by drawing on funds from the Ministry of Culture to cover lost takings, has enabled the

Site to cope with the initial direct effects of the crisis and maintain employee levels; on the other, the University of Padua's budget, which has served as a veritable shield protecting the Site from the long-term effects of the crisis, ensuring continuity of the tender procedures in progress, enabling it to fulfil its contractual obligations and funding activities, essentially serving as investments required for its recovery following the lockdown periods and numerous constraints on public access.

By the end of the pandemic, the University of Padua's 800th anniversary celebrations (2022) presented the opportunity for the Garden to stage its recovery, resulting in the completion of work on the Botanical Museum on the Site (inaugurated in 2023) and subsequent opening to the public, establishing itself as a new instrument for promoting historical memory and leveraging the immense documentary and archival heritage.

When the Museum of Nature and Humankind (*Museo della Natura e dell'Uomo*) opened to the public the same year, completing the narration of natural sciences and strengthening the University's own Museum System, it provided another opportunity for the Garden to develop key scientific and cultural synergies. The brand-new museum pass "Padua City of Science" (Padova città della Scienza) — that provides access to the University's three main cultural sites open to the public (Botanical Garden, Palazzo del Bo and the Museum of Nature and Humankind) and other university museums — recorded a total of 407,344 visitors in its inaugural year (2023), with the Garden reaching its peak admission numbers with 227,305 visitors.

Only the closure of the Biodiversity Garden (see sect. 2.2.2.b) — from July 2023 to April 2025 — bucked the positive admissions trend, attesting to what has become an indissoluble union between the Renaissance Garden and Satellite Garden on the Site's conservation and development journey.

2.2 Protection system and State of Conservation. Risk management (CONSERVATION)

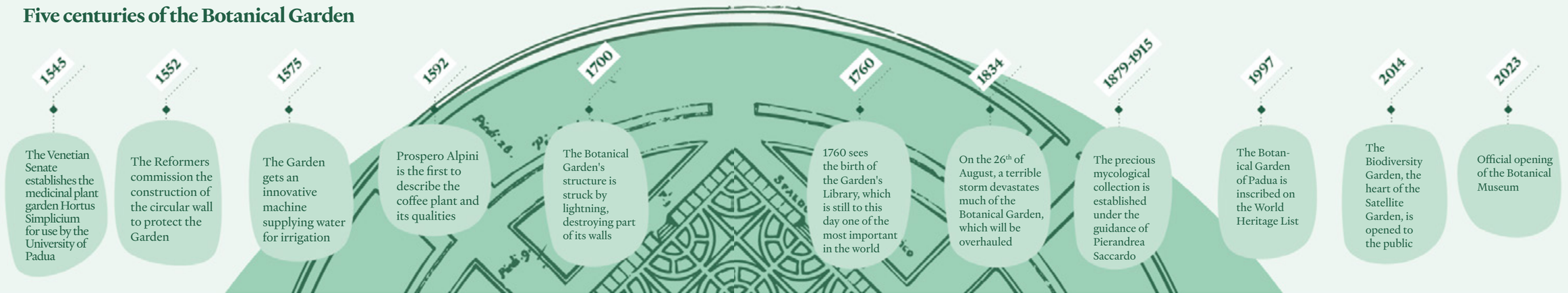
2.2.1 PROTECTION SYSTEM

A series of protection measures apply to the Botanical Garden of Padua, ensuring the highest level of protection by the Italian State. More specifically, in 2011, the Italian Ministry of Culture **determined the complex to be of cultural interest**, meaning it is **covered under art. 12 of Italian conservation legislation** (*Codice dei Beni Culturali e del Paesaggio*), essentially incorporating the restrictions enacted during the previous years. No work of any kind can be carried out on the Site without the permission of the relevant local branch of the Ministry of Culture's Heritage Department (*Soprintendenza*). **Goethe's Palm**, also known as the *albero monumentale*, is a veteran tree included on the national register of notable trees, approved by Italian law (D.M. no. 5450 of 19/12/2017, Italian Ministry of Agriculture, Food Sovereignty and Forestry) and, as such, enjoys specific protected status.

The Site and its urban setting are also protected by regulatory instruments at various levels (regional, district and local).

More specifically, the **Padua City Intervention Plan** (*Piano Interventi del Comune di Padova*, 2023) has instruments to protect the Site from development pressures as only routine maintenance, repairs, restoration and conservation remedial work is allowed in the buffer zone, in line with its cultural values; no development of non-built areas is permitted except to reinstate historic sites or for vegetation and environmental system rehabilitation purposes; work is permitted under the recovery plans

Five centuries of the Botanical Garden



(*Piani di Recupero*) and special planning schemes (*Piani Particolareggiati*), provided the structures built are further away from the Botanical Garden's boundary; no excavations are permitted for the construction of car parks or for other land uses.

The above-mentioned Plan also devotes a specific section of the operational technical standards to World Heritage Sites, setting out specific requirements for urban planning and building work. On this note, it calls for an assessment of the impacts of any work that might affect, even indirectly, the World Heritage Site and requires that directions be provided to mitigate or eliminate the negative impacts found (if any). This regulation opens up the prospect of a potential extension of the Site's buffer zone in order to combine it with the city's other World Heritage Site, namely "Padua's fourteenth-century fresco cycles", with the additional purpose of simplifying the associated protection instruments (see Action 1).

The main protection instruments that apply to the World Heritage Site are given in the table found in Annex 2.

2.2.2 STATE OF CONSERVATION

2.2.2.a Plant heritage

DAILY AND ROUTINE MAINTENANCE

The Botanical Garden's living heritage is constantly cared for, monitored and protected through the daily work of a team of gardeners. Caring for living plant collections also includes regularly replacing dead specimens and selecting new species to be introduced depending on the collections' requirements and the Garden laboratories' lines of scientific research.

The species are catalogued in a special database, which is updated at regular intervals by the collections contact person. Once acquired, the plants are monitored to determine their ability to adapt and thrive in the new environment. Plants that demonstrate an ability to survive and successfully integrate are only added to the collections on a permanent basis and entered in the database following a period of observation. This task is crucial to maintain the collections' vitality and diversity, at the same time ensuring that they are representative for educational and research purposes.

The living heritage Conservation Plan provides for thorough planning of work in various areas (quadrants, Arboretum, pools, greenhouses, paths and nursery) and the distribution of tasks to each worker.

The way work is organized was thoroughly reviewed in 2014 and constantly focuses on rethinking and adjusting the specific tasks assigned to personnel in response to people

retiring, new hires and specific training demands, at the same time being mindful of the skills of the individual workers and the need to adapt to the Garden's ever-evolving situation (see sect. 4.1.2).

In addition to cleaning and maintaining the paths (keeping the gravel tidy, restoring edging), cutting grass and watering, routine maintenance involves a specific series of tasks:

- removing weeds by hand from all areas of the Garden and from the single-species flower beds (weeding);
- harvesting seeds;
- replacing specimens in a poor state of health with new plants or with the introduction of new species;
- taking care of potted plants with fertilizer and replacing growing media;
- pruning smaller shrubs and trees.

For particularly large specimens, pruning involves tree climbing by suitably trained gardeners. This is an advanced technique that also allows the tree to be inspected thoroughly without having to use heavy aerial platforms, which have the unwanted effect of compacting soil around the base of the tree and churning up paths and lawn. The greenhouses require special care all year round, especially between seasons. Since the 2019 restoration, the Biodiversity Garden greenhouses and the 19th-Century Greenhouses have automation systems to ensure optimal values are maintained for plant health, especially in terms of lighting, moisture levels and temperature.

PLANNED MAINTENANCE OF TREE SPECIES

To conserve tree species and correctly manage risk factors, there are scheduled analysis and monitoring activities — in addition to daily care and maintenance — which often involve special measures.

To check plant health, the Garden also employs the services of specialist consultants on plant pathology and entomology from the University of Padua's Department of Land, Environment, Agriculture and Forestry (*TESAF*) and Department of Agronomy, Food, Natural Resources, Animals and Environment (*DAFNAE*).
Plant health checks for the various specimens entail, on a weekly basis and at regular intervals, carrying out site inspections to monitor insect and plant mite populations: alongside visual inspection of the plants, samples of plant material are taken for laboratory testing. When plant pests are detected, instructions are given for pest treatment. Similarly, plant health is checked and quarantine measures adopted whenever new species are introduced from outside the Garden. Each time, the effectiveness of treatments is assessed and the progress of infestations reported to the Garden's personnel.

Constant monitoring of the plants means any infestations can be detected early and appropriate **integrated biological control** strategies implemented by introducing insects into the greenhouses that are natural enemies of the harmful organisms, especially predators capable of attacking them. Further strategies targeting harmful insects include using capture and monitoring devices, such as traps and pheromones, which attract the insects using sex pheromones.
Biological control techniques are normally complemented with natural and physical treatments, such as manual pest control and the use of barriers to protect plants, which are safe for the environment as well as visitors.
The use of plant protection products is strictly limited to areas of the nursery that are not open to the public, in compliance with industry standards.

Tree specimens are **checked for stability** at regular intervals, usually once a year, with the outside help of industry professionals.
The stability assessment is a thorough and detailed diagnostic method carried out with the application of specific protocols to monitor the health of the plant and hence the stability of the specimen or part thereof, in order to avoid the trees being examined falling down, or succumbing to trunk or root failure. The most advanced protocols used are:

SUSTAINABILITY AND CIRCULAR ECONOMY

All the Garden's conservation efforts are carried out with a special focus on **sustainability**: from rainwater collection to correct water management, from the use of electric equipment, including the mulcher (introduced back in 2014 and upgraded in 2024), hedge cutters, leaf blowers, lawnmowers and ride-on mowers. The installation of innovative hi-tech and digital systems for monitoring soil moisture content and the plants' water levels means irrigation can be controlled to meet the vegetation's actual needs, thus minimizing water use and achieving zero waste. Composting system upgrade work was carried out in 2024 so that all plant matter waste can be reused, meaning no more waste needs to be sent to landfill. In line with **circular economy** principles, all organic matter produced in the Garden can be shredded, using the mulcher, to produce compost, part of which is then sterilized and used to make growing media for potted plants, and part spread over green spaces, lawns, flower beds and in the Arboretum as an amender.

- the VTA (Visual Tree Assessment), which involves inspecting the exterior of the specimen, looking for any evidence of structural defects or deterioration processes;
- *sonic tomography* — applied, above all, to larger specimens — which consists in attaching special sensors around the tree; this method can determine the density of wood fibres inside the tree based on how sound propagates from one sensor to another;
- measuring the wood's resistance to penetration (penetrometer);
- *pull test* to assess the risk of trunk or root failure by simulating forces such as wind load on the crown.

Following periodic assessments and based on the directions given in the reports, special measures are taken, where necessary, to care for specimens and make them safe.

Conservation plan for living heritage and growing and conservation support facilities

Type	Quantity	Type of work	Frequency
Herbaceous, shrubby plants (garden beds)	3,200 specimens	Preparing growing media, transplanting, digging, hoeing, weeding, watering, fertilizing, removing dead matter, picking fruit, cataloguing and identifying/ confirming species	daily (from March to November)
Potted plants	800 specimens	Preparing growing media, repotting and supporting the plant, pruning, fertilizing, watering, removing dead matter, securing pots, picking fruit, cataloguing and identifying/confirming species, protecting for the winter by transferring to greenhouses	daily (all year)
Potted plants - succulents	800 specimens	Preparing growing media, repotting and propagation, supporting the plant, fertilizing, watering, removing dead matter, securing pots, picking fruit, cataloguing and identifying/confirming species, protecting for the winter by transferring to greenhouses	daily (all year)
Potted plants - tropical species	300 specimens	Preparing growing media, repotting and propagation, supporting the plant, pruning, fertilizing, watering, plant health check, removing dead matter, pollination, picking fruit, cataloguing and identifying/confirming species	daily (all year)
Tropical epiphytes	100 specimens	Preparing growing media, repotting/preparing and attaching to supports, propagation, fertilizing, watering, plant health check, removing dead matter, picking fruit, cataloguing and identifying/confirming species	daily (all year)

Aquatic plants	100 specimens	Preparing growing media, sowing, replanting, repotting (where applicable), propagation, checking water levels, plant health check, removing dead matter, thinning out vegetation, harvesting seeds, cataloguing and identifying/confirming species, covering ponds for the winter or transferring to a sheltered environment	daily (from March to October)
Arboreal plants	700 specimens	Transplanting, attaching to support (host), plant health checks, stability assessment (where applicable), securing branches and/or the plant (where applicable), pruning dead matter, picking fruit, cataloguing and identifying/confirming species	yearly
Historic and veteran plants	≤ 10 specimens	Plant health checks, stability assessments, root remediation and/or biostimulant treatment, checking and/or replacing branch and/or plant supports, removing dead matter, picking fruit	yearly/as required
Nursery	nursery capacity 1,000 specimens	Preparing growing media, sowing and/or introducing new species or specimens with relevant plant quarantine procedures, reproduction from cuttings, repotting and supporting the plant, pruning, fertilizing, watering, removing dead matter, securing pots, picking fruit, cataloguing and identifying/confirming species, protecting for the winter by transferring to greenhouses	daily (all year)
Lawn areas	10,000 sq m	Reseeding, fertilizing, watering, mowing, clearing and collecting up leaves and branches	twice weekly (from March to November)
Hanging garden	1,000 sq m	Reseeding, watering, pruning shrubby plants, weed control of arboreal and shrubby species, mowing, cleaning	six-monthly
Gravel paths	5,000 sq m	Clearing and collecting up leaves and branches, weeding, topping up and levelling aggregate for accessibility, collecting up dead leaves, maintaining edging	daily (all year)
Packed earth paths	2,000 sq m	Clearing and collecting up leaves and branches, weeding, topping up and levelling for accessibility, collecting up dead leaves, maintaining edging, maintaining wooden steps and rails	daily (all year)
Irrigation system and plumbing	Exterior areas and green-houses	Maintaining plumbing	weekly
		Maintaining osmosis system	monthly
		Managing irrigation system and automation system	daily (all year)
		Checking pipes	seasonal
		Checking efficiency of sprinklers and other emitters; cleaning, adjusting, replacing	weekly
		Emptying the system for winter	yearly
Composting system	Production capacity 50 cu m/year	Shredding plant waste, removing material to a designated area, aerating, activating microorganisms responsible for breaking down matter, screening, sterilizing, storing in storage facility	six-monthly
Rainwater removal system	-	Cleaning grates and drains and checking drainage channels	seasonal

DESCRIPTION AND GENERAL STATE OF CONSERVATION OF ARBOREAL HERITAGE

The Botanical Garden is home to a rich collection of tree and shrubby species The largest tree specimens are mainly located in the *Arboretum* areas and near the outer wall, although the Hortus cinctus is also home to a number of trees, most notably historical specimens of *Magnolia grandiflora*, *Ginkgo biloba* and *Chamaerops humilis*. In the 1990s, increasingly frequent cases of often irreversible decay were observed among numerous trees and shrubs, linked to fluctuations in water supply and numerous outbreaks of honey fungus, or *Armillaria mellea* (Basidiomycete), an agent responsible for root rot and dry rot.

Replacing the existing manual irrigation system with a new automated system (both sprinkler systems) designed to monitor the soil's moisture levels means a suitable amount of water is supplied to meet the actual needs of the species grown in the various areas. The project has reduced water-stress-related fragility (associated with both water shortage and excess water), which increases the plants' susceptibility to pathogens that live in the soil and attack the root system. At the same time, outbreaks of root rot were accurately mapped and measures taken to lower the potential inoculum load by cutting down dead or irreversibly compromised plants and subsequently pulling out tree stumps, infected roots and soil penetrated by the main roots. Treatments have also been systematically applied to address infections in trees of historic and/or scientific interest where the infection is still restricted to only a portion of the root system. Various disease containment strategies implemented over the course of a decade have led to a noticeable reduction in the extent of outbreaks. The health status of the tree population, assessed in terms of vegetative vigour and resulting ability to adapt and/or react to adverse biotic and abiotic factors, is currently satisfactory.

The description of the risk factors for the arboreal heritage can be found in *Risks, critical issues and state of conservation of arboreal heritage* (see Annex 3).

Annual plan for maintenance of arboreal heritage

Type of work	Frequency
Measures aimed at reducing the inoculum load of agents causing root rot	All year round
Treatments applied to specimens affected by root rot	From February to November
Measures aimed at reducing the inoculum load of pathogenic agents and dormant stages of pests	Autumn/late winter
Measures to address adverse biotic factors affecting the crown, where applicable	At the first sign of symptoms, spring/summer
Measures aimed at improving the plants' natural defences, ensuring well-balanced vegetative vigour by means of balanced fertilizing, emergency irrigation, and subsoil aeration	Late winter/autumn

2.2.2.b Biodiversity conservation

Biodiversity conservation is one of the core missions of the Botanical Garden of Padua, which it works towards through both the daily efforts of the gardeners and the study and research structures and tools.

Over spring and summer, the Garden requires intensive maintenance work, such as sowing, transplanting, and preparing beds for the growing season. This is also the period when most planting of new species and tidying up happens, including work of an ornamental nature, ready for the warmer months when visitor numbers are higher. To this end, species are propagated in designated areas of the greenhouses for subsequent planting in beds, using various techniques such as by seed, cuttings, air layering and division of heads, bulbs or rhizomes.

The purpose of harvesting seeds and spores from plants in the different areas is to help build the ***Index seminum***, the catalogue of the species grown in the Botanical Garden, open for exchange with botanic gardens from across the globe (see sect. 1.3).
Seeds are initially separated from the fruits by hand (for example, seeds are removed from the pulp of fleshy fruits by hand and/or using equipment preferably within 48 hours of being picked, in order to limit the onset of fungi and fermentation, which might compromise vitality). Residual impurities such as dust, resinous residue, empty or underdeveloped seeds are then removed using various processing methods either by hand or using mechanical equipment. In many cases, a simple weight-based sorting method can be used, directing a jet of air onto the seeds that will separate out impurities and, at the same time, separate viable seeds from empty ones, thus sorting seeds into like sizes and weights. Alternatively, a series of sieves can be used with different mesh sizes. In more complex cases, seeds are separated by hand with the aid of forceps, taking care not to damage the seed coat. Where possible, seeds are stored in humidity-controlled environments, inside drawer cabinets, in paper packets labelled with the name of the species and an associated code number. The request for material from other corresponding botanic gardens — which still retains its original name *desideratum* — is submitted by filling out special forms, in hardcopy and/or electronic form, at a certain time of the year between January and March/April.

In 1992, the Garden set up a **Gene Bank** for the low-temperature storage of Plant Genetic Resources (PGR), especially seeds (see sect. 1.3). The biobank is one of the genetic biodiversity *ex-situ* conservation methods adopted by national and international institutions not just to ensure the future of endangered species, but also to determine the best conservation strategies to be implemented in the various countries for future *in-situ* conservation actions for these species.
The main techniques used for *ex-situ* conservation include humidity- and temperature-controlled storage (15°C, 15% RH) or cryopreservation (-18°C, 15% RH). The Botanical Garden's Gene Bank is an integral part of *RIBES*, the national network for the *ex-situ* conservation of Italy's natural flora, focused on protecting wild indigenous species, especially those which are threatened or of conservation interest.
A significant infrastructure upgrade process was launched in 2024, embracing an innovative vision that goes beyond the mere medium-to-long-term conservation of PGRs. In line with the goals of the *RIBES* network and following international protocols (such as FAO and ENSCONET), an integrated conservation strategy has been adopted, which has also entailed investing in the area of germination and propagation of species of conservation interest, which are vital to the collections' active maintenance and study. These innovations have enabled the bank to meet growing conservation demands, with a special focus on endemic species threatened with extinction that live in nearby areas within the region, such as in the hill country and mountains (for example, the Euganean Hills, Berici Hills, Lessinia, the Grappa Massif and Asiago Plateau) and coastal areas on the Adriatic.

Catering to the need to improve storage capacity, the creation of the **Biodiversity Garden** has allowed, since 2014, for the introduction of 1,300 new species (in addition to the approx. 2,200 species already grown in the ancient Garden), grouped into environments with the same specific temperature and humidity levels.

THE BIODIVERSITY GARDEN

The Biodiversity Garden is an innovation aimed at representing Earth's different biomes and augmenting the number of plant species that call the Botanical Garden home. Its original knowledge-sharing approach integrates botanical experience with the communication of research and educational themes, playing an important role in raising awareness around climate change issues.

Tropical greenhouse
Featuring high temperature and humidity levels, it houses lianas, bromeliads, philodendra and orchids, in addition to food species such as the cocoa plant and banana tree, and ornamental species like the traveller's palm, showing the enormous biodiversity of tropical forests and their role in maintaining ecological balance.

Sub-humid tropical greenhouse
Reproducing ecosystems like the monsoon forests of the Indian subcontinent, southern China and south-east Asia, and environments like the savanna and jungle of Central and Western Africa and Central South America. It has plants like the tamarind, coffee and pepper and highlights how plants adapt to climates with less rainfall than rainforests and with seasonal variations.

Temperate greenhouse
It houses deciduous plants that are native to Italy, as well as exotic species like the Cabbage tree and Tasmanian tree fern, hibiscuses and Bee-bee tree from Asia and Clethra from the American continent that typically grow in habitats with hot summers and mild winters.

Mediterranean greenhouse
Reproducing the climate characterized by mild rainy winters and hot dry summers, with moderate drought conditions, including species such as the vine, cork, pomegranate, citrus trees and date palm.

Arid greenhouse
The plants found here include the Prickly pear, Candelabra tree and Silver Dollar plant, in addition to many succulents, including cactus and agave native to habitats that have wide-ranging temperatures and the deserts of Africa and Central America.

The "Plants and man" visitor route
The route illustrates the coevolution between plant species and humans, showing how plants and human beings have influenced each other over the course of history. It is divided into four sections, which narrate the fundamental stages of this relationship: 1) the origins of the domestication of plants around 11,000 years ago to make them more useful and productive; 2) how plants have "domesticated" humans, becoming essential for food, medicine, clothing and building; 3) civilizations that have extracted everything they need from a single plant; 4) future prospects with plants in space, plant-based plastics, and green architecture.
It uses an innovative exhibition approach that combines archaeological finds, art installations, interactive and multimedia exhibits to actively engage visitors, offering an unprecedented dialogue between botany and cultural anthropology within the setting of a historic botanic garden.

The Biodiversity Garden was closed to the public from July 2023 to April 2025 for preventive technical testing, as part of an investigation ordered by the Court of Padua, to ascertain the causes behind some of the greenhouse glass panels breaking (see Action 4).

2.2.2.c Architectural and decorative heritage

PLAN FOR THE CONSERVATION OF ARCHITECTURAL AND DECORATIVE HERITAGE AND ITS LANDSCAPE AND ENVIRONMENTAL SETTING

The structures making up the Botanical Garden have undergone work to restore, convert and enhance the buildings and decorative structures, at the same time improving their state of repair and overall functionality and ensuring the whole complex is in a good state of conservation.

The financially substantial project was planned as part of the University of Padua's three-year public works programmes, thanks to funds from the University's own budget in addition to national and European funding. The economic and financial details of the work carried out on the Site and relevant surrounding area since its inscription on the WHL, summarized below, are set out in the investment plan (see sect. 4.3.1).

In 2008-2009, work was carried out on all the ancient manmade structures within the Garden as part of a major restoration project. More specifically, the **circular wall** was restored, which also involved rendering the inside of the wall with the original *cocciopesto* finish, a traditional plaster made from lime and crushed brick. The project also included restoring the marble balustrade running on top of the circular wall, the entrance columns and associated acroteria, the statues, fountains and all wrought iron gates. Over 15 years on from this work, the recent diagnostic campaign has revealed the need for a new general restoration project in light of the deterioration (attack by biological agents, minor damage and slips) affecting, above all, the stonework (see Action 5).

In the same 2008-2009 period, **stratigraphic samples** were taken from each of the Renaissance Garden's four quadrants and, based on the ensuing stratigraphic reports and comparison with like samples, a hypothesis was advanced on what the original design would have looked like. Two successive construction phases can be made out, in all likelihood relating to the same building cycle; in terms of ground levels, the made ground between the low walls to the east and south, installed during the first phase, reached a height of 11.35 m, namely at least thirty centimetres or so higher than the surrounding ground level, though it was probably originally even deeper. An additional, more recent phase, which may date from the eighteenth century, saw the

construction of kerbs around the quadrants, virtually matching up with the current trachyte kerbs, laid on top of the existing low walls, where present, but in some cases deviating slightly in alignment. In this phase, there is no discernible difference between the original ground level of the quadrants and paths and their current counterparts: the paths' gravel is generally laid on top of a layer of earth, and the previous level may have fallen within those few cm of depth.

In terms of the **environmental and landscape setting**, as part of the Biodiversity Garden's construction work, the reinstatement of the waterway (also known as the **UNESCO Canal**) along the southern boundary, in 2014, serves to clearly delineate the perimeter of the 16th-century Garden's original plot. During that project, restoration work was also carried out on the 19th-century **ice-house**, the only remaining element of the palace and extensive grounds that Padua-born opera singer Gaspare Pacchierotti had built in that area of land.

A thorough refurbishment of the **Goethe's Palm glass house** (2015) improved the conservation conditions of what is the oldest plant in the Garden, while restoration of the **19th-Century Greenhouses** (2018-2019) led to the removal of certain later additions, updating of the building services and improvement of the layout of the spaces to accommodate the collection of carnivorous plants, house a portion of the plants in winter and store seeds. Restoration work on the **bromeliad greenhouse** (commenced in late 2024) sought to increase its capacity to grow and reproduce species — building on existing biodiversity conservation efforts — improve energy efficiency, reduce consumption, and open up growing spaces to visitors. Driven by the same goals, additional major work was started in 2025 to restore and upgrade some of the **propagation, growing and quarantine greenhouses** (see Action 3) and, inspired by the principles of energy efficiency and environmental sustainability, work began on the Garden's lighting system aimed at improving the Site's safety and accessibility and expanding the Site's use by the public (see Action 7).

Between 2020 and 2023, the conservation project, along with measures to shore up the building that once housed the **Prefect's Residence** and update the relevant building services, culminated in the opening of the Botanical Museum and refurbishment of the Library spaces and reading rooms, which included installing multimedia and exhibition spaces. As part of the project, renovation work was also carried out on the consultation rooms used by scholars visiting the **historic Herbarium**, and a multipurpose teaching room has also been set up (see sect. 1.3).

RESTORATION OF THE GOETHE'S PALM GLASS HOUSE

The palm has always been protected by a glass house. It was most likely a movable glass house in the beginning, but the plant's considerable size would later have made it essential to erect a permanent structure, which had an octagonal design and was built from timber with removable glass panels. A description of this protective structure can be found in records from the time when the Garden was run under Roberto De Visiani (Prefect from 1836 to 1878), who was also responsible for its reconstruction and extension, funded with his own money. This structure was later raised one and a half metres by order of Prefect Pier Andrea Saccardo in the early 1900s and, during Giuseppe Gola's prefecture (1921-1947), the glass house underwent a complete renovation, at which point the masonry structure was introduced. In the years that followed, the glass house's height was increased once more and routine maintenance work was carried out, mainly concentrating on the glass panels and replacement of timber elements with a masonry structure. This brings us up to the present day, where the history of the palm and the glass house that enshrines and protects it is linked to the Garden's major extension initiatives. The structure now stands around 12 metres tall and provides the palm with an excellent home while affording the public an unrivalled view of this historic, monumental specimen known the world over.

RESTORATION OF THE 19TH-CENTURY GREENHOUSES

The 19th-Century Greenhouse spaces have benefited from a thorough restoration, in 2018-2019, whereby all the distinctive features of these unique buildings have been reinstated. The structural metalwork, which features distinctive decorations and arched or volute details, has been restored and reinstated. The extensive glazing on the southern side, which was so badly deteriorated as to be beyond salvage, has been replaced with new exterior joinery featuring modern control and opening systems. To achieve optimal climate conditions, given the considerable extent of the existing glazing, motorized shading systems have been produced using woven material and are connected to the greenhouses' computerized climate control system.

Two of the greenhouses are used over the winter as a *tepidarium*, a moderately heated greenhouse, to house potted plants, while the third is home to a permanent collection of insect-eating plants.

Over the spring/summer, when the plant collections are displayed outside, the greenhouses are used to host cultural events and exhibitions. Work began in 2025 to build a new orchid greenhouse and nursery greenhouses, which will once again stand in the courtyard behind the building as part of a wider redevelopment project designed to be true to the original elevations and views.

The conservation of the **Keeper's Lodge** (completed in 2024) involved converting the building, which now houses the visitor services coordination and management offices.

The stonework (**fountains, statues, balustrades**) was **restored** over the same period, providing an opportunity to address the widespread deterioration experienced by the various sources of water.

Lastly, the **dredging and repair of the Alicorno canal** (2024) at the entrance to the Garden has meant the historic canal carrying water to the Garden has been restored to a proper state or repair. Driven by a memorandum of understanding between the University and local river network management consortium *Consorzio di Bonifica Bacchiglione*, the project entailed dredging the bottom of the canal, restoring the banks and pruning vegetation lining the canal, retaining the natural wetland species.

The architectural and decorative heritage's routine maintenance falls under the University of Padua's general building and systems scheduled maintenance plan. However, given the significance and unique nature of the structures making up the Botanical Garden, a specific plan was drawn up in 2024 for the **routine maintenance and specific repair** of the Site's manmade structures (see Annex 4). The very nature of these places, with their wealth of water and vegetation, calls for conservation that cannot be achieved with a one-off remedial restoration project, instead requiring a specific schedule and maintenance that ensure the effects of the project are enduring. The interaction between porous materials, water and an environment featuring a large number of tree species increases the potential for structures to fall into disrepair. Consequently, merely identifying and accurately mapping deterioration factors is not enough: it requires a deep understanding of the inextricable link between the structures and their setting, tailoring the planning of restoration work to this distinctive context

The maintenance plan clearly identifies deterioration factors affecting various materials (stone, brick, plaster, metal) and sets out a detailed work procedure (see Action 5), which will be followed up with a monitoring plan based on two distinct levels of detail at six-monthly intervals.

2.2.2.d Herbarium and Botanical Museum collections

Conservation of the **historic Herbarium's** almost 700,000 samples involves daily and periodic routine maintenance, as well as non-routine maintenance.

The collections' conservation, monitoring and planned maintenance are handled by the collections' Conservator and Technician with the University Centre for Museums (*CAM*), which has a branch in the Botanical Garden, and involves:

- daily monitoring of environments, above all checking temperature, lighting and humidity settings;
- triweekly cleaning of environments;
- special dusting once a year;
- periodic insect monitoring to check for pests.

The historic Herbarium maintains constant settings in terms of temperature (20-22 degrees), lighting (max. 50 lux) and relative humidity (50%).

Access to the Herbarium is granted to scholars and enthusiasts by appointment. Consultation takes place with the Conservator in attendance, who issues protective gloves: the compulsory PPE for handling the samples.

Non-routine maintenance work was carried out on the spaces housing the herbarium samples in 2025, when the whole collection was transferred to the University of Florence for digitization of Padua's whole herbarium collection.
The major digitization project was made possible with NRRP funds *under the* National Biodiversity Future Center (NBFC) project, whose *Spoke 7 - biodiversity and society* is coordinated by the University of Padua. The project — which is a collaboration bringing together leading universities and institutions holding herbarium samples at a national level and large specialist companies — involves 4,250,000 herbarium sheets and seeks to preserve this heritage in digital form for the community, ensuring that it is conserved and, at the same time, can be accessed for research purposes as well as for promotion and raising awareness on an extremely wide scale.

The work will be completed to this end with the acquisition of the metadata present on the herbarium sheet labels (containing the place of collection, date and scientific name of each specimen), thus enabling us to make up for the currently limited cataloguing of the Herbarium's heritage, locate specific specimens and fully understand the breadth and composition of the collections (see Action 9).

A bibliographical heritage comprising 50,000 books and 700,000 specimens held in the historic Herbarium

In parallel with this massive project (which involves 80% of Padua's entire collection), the Botanical Garden has employed its own resources to complete the digitization of the impressive Forti algae collection (2024-2025), with the associated metadata management requiring funding under Italian law *Legge 77/2006* (see Action 18).

There are 136 specimens on display in the Botanical Museum's Gallery of **herbarium samples**. Their proper conservation is also ensured in exhibition spaces by constant temperature, lighting and humidity settings, which are monitored at least weekly by the collections' Technician, who does this by downloading information recorded in the dataloggers installed in each display case. The herbarium samples on display are rotated completely on a yearly basis for conservation purposes.

The visitor route through the Museum takes in only a selection of the impressive historic and botanical heritage conserved in the Garden, which, in addition to the herbarium samples, includes a rich collection of diatom slides, seeds (*Spermoteca*), a carpological collection, a xylarium and an extensive 19th-20th century educational collection of wall charts and fungi models.

2.2.2.e Archival, bibliographical and digital heritage

The bibliographical and archival material is extremely fragile and susceptible to specific risks, most notably environmental factors, which can result in them becoming damaged.

The shelving units in the historic Library's storage room are fire resistant and have an internal humidity and temperature control system. They have an electric lock and are connected to a surveillance and monitoring system and the fire alarm system. Any abnormal changes in temperature detected in the spaces set off alarms and the compartments cannot be opened. The members of the University Centre for Libraries (*CAB*) staff actually authorized to open the cabinets are identified by name.

The **Conservation Plan for bibliographical material** held in the Library provides for daily monitoring of shelving units, checking the seals on windows and doors, and checking temperature and humidity. All rooms are climate controlled and the HVAC system control meets the guidelines of the IFLA (International Federation of Library Associations and Institutions). Temperature is maintained between 18 and 20°C (with maximum deviations within a 24-hour period of ±2°C) and relative humidity between 45 and 55% (with maximum deviations within a 24-hour period of ±5%).

Access to the library is by appointment. Visitors are required to register personally to view the historical and antique volumes and consultation takes place one volume at a

time, on special bookstands, with a librarian in attendance to supervise. For certain volumes and/or particularly fragile material, the librarian alone turns the pages, wearing protective gloves.

The University Centre for Libraries (*CAB*) is responsible for assessing, planning and funding book restoration work.
In 2023, a special operation was undertaken to identify the presence of parasites, and disinfect and dust the material, and involved the restoration of 113 volumes. Further restoration work is planned, as well as projects for the digitization of the Garden's bibliographic heritage (see Action 9).

INVENTORYING, DIGITIZING AND ENHANCING THE HISTORICAL ARCHIVES

Between 2018 and 2022, a project was carried out to enhance, reorganize and inventory the historical archives of the Botanical Garden of Padua *(Progetto di valorizzazione, riordino e inventariazione dell'archivio storico dell'Orto botanico di Padova (1763-1921))*; the operation was developed by the University Centre for Libraries (CAB) with the collaboration of the University Archives department and the scientific coordination of the University of Padua's regular professor of the History of science. Starting with the documents' conservation and storage in appropriate enclosures, the project progressed to digitizing and making an inventory of the documents in the University archive system, which included converting, modelling and enriching metadata. The Garden's digital repository will be added to in the future with additional material present in the historical archives, such as the Alessandro Trotter collection or Achille Forti collection, which are currently undergoing digitization.
The final outcome of the project was the archives' publication online on PHAIDRA, the platform that the University Library System uses for archiving, long-term conservation and online dissemination of digital assets and collections. The platform embraces the *FAIR* principles as mentioned by the European Commission to promote open science wherein data are *Findable*, *Accessible*, *Interoperable* and *Reusable*, and is one of two Italian archives with *CoreTrustSeal* certification, a system that certifies the quality of digital repositories.
Thanks to the "Linked Heritage" project, funded by the European Commission's ICT-PSP Programme between 2011 and 2013, some PHAIDRA collections can also be accessed through *Europeana*, Europe's massive digital library.

2.2.3 RISK MANAGEMENT

The Botanical Garden of Padua's activities, structures and collections are vulnerable to risks of various kinds, which have also been highlighted as part of the Third Cycle of Periodic Reporting (2023).

The specific risk and main critical issues for the arboreal heritage are described in Annex 3 and they are addressed, in terms of prevention and mitigation of harmful effects (if any), with the historic garden's routine and planned maintenance (see sect. 2.2.2).
Similarly, risks and measures to mitigate harmful effects on the architectural heritage are described in the Maintenance Plan for ancient manmade structures (see Annex 4).
The Conservation Plan for bibliographical material sets out the risk management procedures for bibliographical heritage (see sect. 2.2.2.e).

In more general terms, to address critical issues, threats and situations that endanger people or property, the Site has put in place a series of measures, instruments and plans for prevention, emergency service callouts and minimization of any resulting damage.

PREVENTION, SECURITY AND MONITORING

In addition to the contracted services in charge of looking after the Museum, its visitors and its surveillance, a private security firm has been tasked with performing night watch duties. All spaces have an intrusion-detection alarm connected to a central monitoring station and/or the police.

The **video surveillance system** covering exterior and interior areas across the Garden's ancient core site was overhauled (2024) to cater to the need for improved monitoring and security, extending the heritage protection areas, which were previously limited to the perimeter and main historic buildings.
The simultaneous integration of all equipment into a single monitoring system, which covers the full extent of the Garden, is a useful complementary tool to the active surveillance services both in terms of preventing possible vandalism and of handling emergencies.

Emergency services are called using specific numbers for the different services (intrusion detection and fire alarm) and building services repair service (plumbing and electrical system faults), which operates 24/7.

FIRE RISK

All buildings making up the Botanical Garden complex, including the greenhouses, have a fire detection/fire alarm system connected to a central monitoring station and have a *CPI* certificate demonstrating compliance with Italian fire safety standards.

NATURAL RISKS

In the event of risks as a result of extreme events, following warnings issued by the weather service and/or civil defence, a temporary shutdown of the Site may be ordered and/or other measures may be taken to contain the risk, including restricting access to individual areas of the Garden depending on the seriousness of the threat. These measures, which are in addition to the Emergency Plan's procedures, are put into action as a matter of emergency by the Prefect of the Botanical Garden and/or, in their absence, by the Manager of the Permanent Events Office (*UEP*)/Communication and Marketing Area (*ACOM*) and/or by the Botanical Garden Curator, and are mainly aimed at preventing harm from falling branches, shrubs and/or trees along the main paths and secondary trails.

In the event of risks resulting from other natural events, such as flooding or earthquakes, Padua City Council has adopted a **City Civil Defence Plan**, which includes prevention measures, emergency procedures and available resources for handling hazardous situations. The Botanical Garden is mentioned in the Plan as a site of cultural interest to be protected in the event of a disaster.

The Plan provides for specific prevention measures and actions to mitigate the **water-related risk**, such as activating the regional *CFD* centre's monitoring and warning system, which works in concert with Italy's civil defence, in the event of extreme weather events.

When it comes to **seismic risk**, while Padua is rated a low-risk area, the Civil Defence Plan identifies the old city centre as a "zone with a potentially greater impact by the built environment" due to the presence of historic buildings and their vicinity to the city's road network.

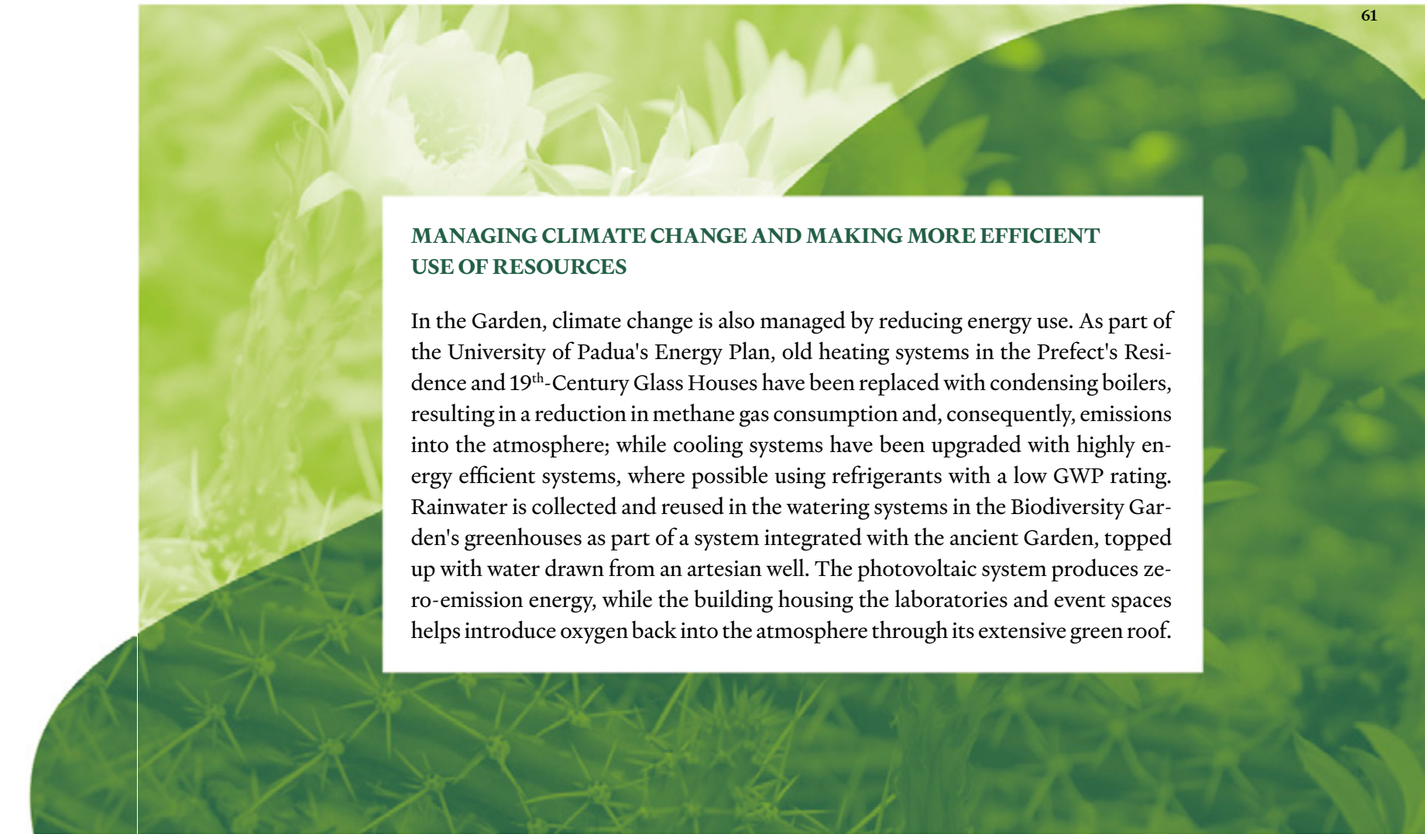
All the Botanical Garden's buildings are to code in terms of earthquake strengthening and static loading, and are monitored by technicians from the University's Building and Safety Area (*AES*); specific seismic retrofit work and earthquake strengthening was undertaken on the Keeper's Lodge and Prefect's Residence as part of the building conservation project (2022-2024).

CLIMATE CHANGE

The threat posed by climate change is addressed, at a city-wide level, through **Padua's Sustainable Energy and Climate Action Plan**, whose goal is to reduce GHG emissions to 55.3% by 2030 and which identifies new adaptation measures and policies for the city designed to tackle the growing challenges linked to extreme weather events. In recent years, the city of Padua has frequently experienced this kind of extraordinarily intense weather phenomena, which were once unusual for these latitudes, funnelling such huge amounts of rainfall in such a short time that the ground struggles to cope, in addition to lengthy heatwaves, even in autumn, and often with significantly above-average temperatures even during the winter months.

So far, the Botanical Garden's living heritage has adapted to these new climate conditions, thanks in part to efficient irrigation systems that help keep plants hydrated even during periods of prolonged drought. Nonetheless, despite the irrigation systems, some arboreal plants might suffer due to heatwaves or a reduction in the available groundwater, with some specimens already showing signs of stress, such as defoliation, which is a natural reaction that limits loss of water, but also reduces the plant's capacity for photosynthesis. The Botanical Garden monitors these signs closely so it can take prompt action and adapt care techniques accordingly, and also plan for the future introduction of more drought- and heat-tolerant species.

The upgrade to the existing drainage system in the ancient Garden's quadrants (2024) has meant flooding can be avoided in the event of heavy rains and extreme events, with evident improvements in terms of the garden's use, safety and plant conservation due to more even rainfall distribution.



MANAGING CLIMATE CHANGE AND MAKING MORE EFFICIENT USE OF RESOURCES

In the Garden, climate change is also managed by reducing energy use. As part of the University of Padua's Energy Plan, old heating systems in the Prefect's Residence and 19th-Century Glass Houses have been replaced with condensing boilers, resulting in a reduction in methane gas consumption and, consequently, emissions into the atmosphere; while cooling systems have been upgraded with highly energy efficient systems, where possible using refrigerants with a low GWP rating. Rainwater is collected and reused in the watering systems in the Biodiversity Garden's greenhouses as part of a system integrated with the ancient Garden, topped up with water drawn from an artesian well. The photovoltaic system produces zero-emission energy, while the building housing the laboratories and event spaces helps introduce oxygen back into the atmosphere through its extensive green roof.

REDUCING ENERGY USAGE

- Solar energy screening capacity for the Botanical Museum: **80 %**
- Reduction achieved by replacing boilers and installing low-temperature underfloor heating system: - **20%** in methane gas consumption
- Harvesting and reuse of rainwater: **3,643,722 litres/year harvested** by means of a large 450,000-litre storage tank;
- Solar PV plant electricity generation: **52,305kWh/year**, with a 33,933kg/year reduction in CO2 emissions
- Oxygen production by buildings' green roofs: **766,500 litres/year of O_2**

When it comes to manmade structures (especially stonework), it should be noted that rainfall encourages extensive biological and microbiological contamination as water is the main factor affecting the speed at which surfaces are colonized.

EMERGENCY PLAN

The purpose of the Emergency Plan is to set out how people who are inside a building are required to act in the event of an emergency. It details the procedures to be adopted depending on the type of event and based on the day and time the emergency occurs. It identifies the role of Emergency Coordinator as well as the roles of Fire Wardens and First Aid Wardens.

The Botanical Garden's Emergency Plan contains the emergency management procedures for personnel and vehicles should buildings experience an emergency event (such as a fire, gas leak, flooding, earthquake, etc.). An Emergency Plan specifically for the offices, greenhouses, Biodiversity Garden and visitor centre was drawn up in 2016, while the Emergency Plan for the Biodiversity Garden and Library is dated March 2025 (see Annex 5).

In order to coordinate emergency procedures for all the areas that make up the Site and to define in greater detail the risk scenarios of a place that has areas both outside and inside buildings with different characteristics in terms of structure, function and building services, and that may be occupied by any combination of visitors, researchers and personnel working for the University and other bodies/companies, an integrated Management Plan for the Botanical Garden is due to be compiled, which will be part of the Disaster Risk Management Plan (see Action 8).

All spaces have emergency evacuation map signs, showing escape routes and assembly points.

From top: Goethe's Palm glass house before and after the 2015 restoration

From top: 19th-Century Glass Houses before and after the 2018 restoration

From left: the *ginkgo biloba* (1785); Goethe's Palm (1585); the Oriental plane (1680)

The Botanical Garden and its relationship with the city's neighbouring monuments (overlay over an aerial photograph of the city of Padua). The image documents the state of the former Antonianum sports facilities at the time prior to the creation of the Satellite Garden

From top: the former Antonianum area following demolition of the sports facilities (2009); the Biodiversity Garden greenhouses in the Satellite Garden area

Upgrade works, dredging and strengthening of the banks of the Alicorno canal (2024)

Restoration of the statue of Theophrastus, and the before picture for comparison (2024)

New Botanical Museum fitout (2023). From top: Gallery of herbarium samples and Apothecary's shop

From top: Botanical Theatre (1842) following the 2023 restoration and the coffee plant in P. Alpini's *De plantis Aegypti* (1612)

2.3 Relationships with the local community and public engagement (COMMUNITY)

There are numerous communities that are relevant to the Botanical Garden and they can be split into different levels:

- the **university community**, as a promoter, organizer and beneficiary of study and research, knowledge dissemination and public engagement activities;
- the **local city and regional community**, as a primary beneficiary of the cultural Site, its educational activities and its conservation, promotion and enhancement initiatives, as well as an important stakeholder due to its vicinity and/or role in the Site's development;
- the **national and international scientific community**, as a stakeholder and partner in the development of collaborations with universities, institutions and botanic gardens from all over the globe.

The above communities are joined by the wider **community of visitors**, made up of both tourists and day-trippers, coming from every region across Italy and outside its borders and sharing a common keen interest in places of art and science with a focus on the subjects of botany, natural sciences and ecology.

2.3.1 UNIVERSITY COMMUNITY

The Botanical Garden was originally established to help in the study of "simples", namely medicinal plants that were the main resource used for cures at the time. It was actually Professor Francesco Bonafede — who was appointed by the Veneto Region Senate in 1533 to the chair of *Lectura Simplicium*, in charge of teaching said "simples" — who advocated the need for students to be able to learn through practical training and direct observation of the plants and not just from studying descriptions taken from the writings of ancients (notably Galen, Theophrastus and Pliny) and from examining dried plants sourced from the ancient pharmacies, known as apothecary's shops.

The university community of lecturers and students thus represents the founding core of the Garden and, to this day, the educational purposes of its scientific research are the engine driving its institutional mission. Furthermore, with its efforts in organizing scientific conferences and workshops, alongside cultural and dissemination events, the Botanical Garden is an important centre bringing together the university community.

Study and research activities, run by lecturers and researchers from the University's Biology Department, contribute to the development of a community based on knowledge sharing and cross-pollination of skills, with activities that actively involve the Department of Agronomy, Food, Natural Resources, Animals and Environment (*DAFNAE*), Department of Land, Environment, Agriculture and Forestry (*TESAF*), Department of Historical and Geographic Sciences and the Ancient World (*DISGEA*), Department of Pharmaceutical and Pharmacological Sciences (*DSF*) and Department of Cultural Heritage (*DBC*) in daily teaching activities or research and collaboration projects at the national and international level.

Other University cultural and museum sites (now brought together as part of the "Padua City of Science" museum pass) also fall within the Garden's relevant university community, above all the Museum of Nature and Humankind and the Villa Parco Bolasco complex, whose commercial management is shared by the Garden (see sect. 4.1).

This combination of historic, scientific, cultural and social value makes the Botanical Garden a key asset for the University of Padua, which awards it a central role in its Communication and Third Mission strategies relating to heritage enhancement and promotion.

2.3.2 LOCAL COMMUNITY

The local community, mainly city residents and the regional community, is multifaceted and mainly made up of visitors who are directly targeted by the Botanical Garden's activities. They can be split into different target audiences, grouped by age, origin, interests/needs, and repeat visit frequency: families with children; students and young people in various age ranges (from primary school to university); experts and researchers; botany and natural science enthusiasts; and people with special needs.

The Garden shares study- and project-related themes with relevant educational, scientific and cultural institutions across the region as part of a wider heritage conservation, promotion and enhancement mission combined with that of community education and cultural development.

The Garden works closely with like organizations, creating networks and collaborations for the delivery of initiatives and activities that supplement its own cultural offering.

Some of the most notable entities in this sense are other cultural sites across the city and region, especially the serial UNESCO Site "Padua's fourteenth-century fresco cycles", regarding which Padua City Council is the relevant contact point and, together with the Botanical Garden, takes part in institutional roundtables, collaborating on initiatives and actions that share the common purpose of promoting knowledge of World Heritage (see sect. 4.2).

Other bodies have relevant areas of responsibility that overlap with the Garden, notably the main institutions and authorities operating in the field of environmental and regional protection, and conservation of flora and fauna (for example, Euganean Hills Regional Park, and regional and national parks in the Padua area) and local branches of Governmental bodies (for example, those appointed to watch over protected natural areas and monitor for trafficking of species of fauna and flora - CITES). Other bodies of interest to the Garden include the main environmental and landscape protection organizations, given their common interest in sustainability, biodiversity and care for the environment.

This remarkably dynamic relationship with the local community today prompts the need for the Garden to work out a structured community engagement path with its own goals, strategies and tools for measuring outcomes.

The preparation of the Management Plan has provided the first opportunity in this sense. Endeavouring to implement a participatory and inclusive approach, the process of working on the Plan has been successful in engaging local communities, stakeholders and experts to promote a sense of responsibility towards a cultural heritage that is an asset shared by all. An institutional roundtable was convened for this very purpose with the participation of the City Council, District Council, Regional Council and the Heritage Department (*Soprintendenza*) and a participatory process was initiated involving individuals operating in cultural, social and educational domains as well as in business and tourism to gather different points of view and share project ideas (see Annex 6).

The encouraging results of this approach prompt a shift from thematic roundtables to more systematic meetings for discussion, which will also involve the UNESCO Site "Padua's fourteenth-century fresco cycles" to promote Padua as both a "*City of Art and City of Science*" (see Action 22).

The Botanical Garden's projects follow the same direction, with application for funding allocated by the Veneto Regional Council for the region's UNESCO Sites under the ERDF Regional Programme 2021-2027 (see Action 12).

2.3.3 SCIENTIFIC COMMUNITY

Over the years, the Botanical Garden has established a strong network of relationships of the greatest importance with the most authoritative Italian and international scientific institutions.

BOTANIC GARDENS

The Botanical Garden maintains ongoing, longstanding relationships with other Italian botanical gardens such as — to name but a few — Palermo, Modena and

A cultural site epitomizing how academia connects with the local community and international scientific community

Reggio Emilia, Parma, Pisa, Florence, Milan, Rome, Turin and Naples. Networking mainly takes the shape of collaboration on scientific activities (for example, scientific conferences, setting up research groups, participation in the same institutional networks), though there are also various sessions where stakeholders meet in relation to enhancement and promotion activities. There is a specific agreement in place between the Garden and the University of Parma, Italy (2024-2027) for the staging of exhibitions, events and projects and collaboration on study, research and scientific dissemination activities on themes of common interest. Similar agreements with other institutions are in the pipeline.

At an international level, the Garden of Padua is one of only three botanic gardens in the world to be inscribed on the World Heritage List, the other two being **London's Kew Royal Botanic Gardens** and **Singapore Botanic Gardens**, which were inscribed as cultural sites in 2003 and 2015 respectively.

In 2015, the Botanical Garden and the National Parks Board of Singapore (responsible for managing the Botanic Gardens) signed the first Memorandum of Understanding (renewed in 2023), which provides for the exchange of personnel and researchers, as well as for mutual access to managerial experiences, information and materials (such as seeds and plants) and the holding of shared events and projects for 5 years, through to 2027.

The first trilateral joint meeting, promoted by the Garden, was held from 19 to 21 February 2024, involving representatives from the other two institutions who joined the Garden to discuss common research issues and exchange information and projects on conservation, promotion and enhancement. The public event that wrapped up the programme of works was devoted to the relationship between the acknowledged "Outstanding Universal Value" of the UNESCO Sites and the tangible, daily responsibility of conserving, promoting and enhancing the plant world.

On the scientific front, an article on the role of UNESCO botanic gardens in biodiversity conservation is currently being jointly written by the three Sites, while a scientific collaboration with Kew Gardens is under way on the subject of herbarium samples with the "PowerPlant" project (see Action 13). The project aims to develop an algorithm capable of leveraging AI to identify herbarium samples that are most likely to be successful for the extraction of ancient DNA, paving the way for advanced research into the genetic history of plants.

On the subject of herbarium samples, the Garden of Padua also collaborates internationally with Munich's Botanical Garden as part of a study on the identification and automatic cataloguing of samples that have yet to be identified, and the reading of

historical labels (metadata management, transcriptions and georeferencing); while back in Italy, the Botanical Museum's collections are the subject of the NBFC's digitization project (see sect. 2.2.2.d).

A scientific collaboration is in progress with the Montgomery Botanical Center (Florida - USA) for the study of palm DNA, focusing on the genomics of Goethe's Palm.

In 2024, the Botanical Garden signed an MoU with the Botanical Institute of Kunming (Yunnan, China), as part of the two institutions' twinning promoted by the Consulate General of Italy in Chongqing, to coincide with celebrations marking the 700th anniversary of the death of Marco Polo.

NATIONAL AND INTERNATIONAL NETWORKS

Since 2005, the Botanical Garden has been a member of Italy's **RIBES – Rete Italiana Banche del Germoplasma**, the network established for the ex-situ conservation of Italy's natural flora. The network has 18 member institutes, most of which operate in Italy, mainly university botanical gardens, although members include local governments, natural history museums, national parks, non-profits and businesses.

The Garden has also been a member, since 1980, of the **Italian Botanical Society (SBI)**, an important scientific organization founded in 1888 concerned with promoting scientific research, education, and the study of botany and sharing of related knowledge in Italy. It brings together scholars, researchers, professors, students and botany enthusiasts, offering a go-to source for the scientific community and for anyone who is interested in flora and vegetation. It also publishes leading industry titles, such as *Plant Biosystems* and *Italian Botanist*, as well as papers, manuals and other material intended for a wider audience.

On the international front, the Botanical Garden is a member of **BGCI – Botanic Gardens Conservation International**, an international organization operating in over 100 countries working to safeguard plant biodiversity: it supports the development of international conventions, such as the Global Strategy for Plant Conservation; champions the mainstreaming of best practices and conventions; organizes conferences and international meetings; develops joint plant conservation programmes; and maintains an up-to-date database on botanic gardens (Garden Search) and on plants in cultivation (Plant Search). At a European level, the BGCI operates through the **European Botanic Gardens Consortium (EBGC)**, which, since 1994, has been an umbrella organization bringing together all representatives of national European botanic garden networks.

The Consortium organizes periodic conferences and promotes international initiatives like the International Plant Exchange Network (IPEN); facilitates the exchange of information between national networks and European coordination, driving common projects and encouraging the widespread adoption of standards and best practices, and the updating of databases. The Consortium has developed and published an Action Plan for botanical gardens in the European Union, which is an important contribution to initiatives like Biodiversity Strategy, the European Plant Conservation Strategy and the International Agenda for Botanic Gardens in Conservation.

OTHER COLLABORATIONS

The Botanical Garden's scientific collaborations at a national and international level are developing all the time, with the associated dynamics depending on the funding of research projects promoted and conducted by individual professors and researchers belonging to different University Departments who also work in the Botanical Garden spaces. The Research Plan drawn up by the Botanical Garden University Centre — which is available for public reference — gives an account of this wealth of projects, which covers a range of issues related to the environment, biodiversity conservation and climate change with a three-year outlook.

Additional information and updates on research collaborations can be found on the website: ortobotanico1545.it/en/research-and-collections/research-projects

2.4 Education, teaching and research (CAPACITY BUILDING)

2.4.1 LEARNING AND EDUCATIONAL PLAY PROGRAMMES

True to its tradition as a centre for the dissemination of scientific knowledge, the Botanical Garden offers a rich programme of learning and educational play activities aimed at both younger generations and an adult audience.

A specific **Education Programme** was systematized in 2024 with the aim of providing a picture of the undertaking over the last ten years and creating a framework for projects and activities to be carried out over the next five years, extending the range of themes covered and further diversifying the types of action, while staying true to the principles and reasons for the Site's inscription on the World Heritage List (see Annex 7 and Action 14).

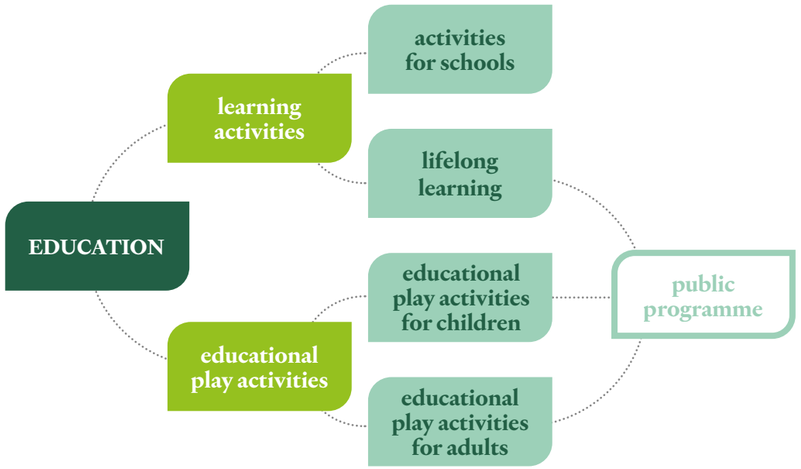
The Programme promotes lifelong learning, stimulating curiosity and discussion through activities aimed at specific target audiences, in line with inclusivity principles.

It provides for a series of actions, projects and tools designed to promote:

- knowledge of the plant and natural world;
- understanding of natural phenomena and social events based on certified knowledge and a critical approach;
- a sense of responsibility around caring for the environment and the importance of biodiversity conservation.

The Programme aims to raise awareness of the Site's natural and cultural heritage by:

- offering an integrated approach that encompasses science, culture and arts;
- building a sense of connection with the place;
- leveraging edutainment as a learning and engagement tool;
- providing welcoming and inclusive spaces to be used for interdisciplinary projects.



The purpose of **learning activities** is to deliver personal and professional learning for individuals — schools, families, adults and local residents. These are activities that provide elements that can help further the individual's level of education and develop skills in certain areas that may be in some way related to the natural world.

Education aimed at **schools** across all categories and levels provides a range of specific programmes, tailored to different age groups, to help children and young adults become engaged with the world of nature and develop awareness around the importance of biodiversity conservation and caring for the environment. The activities consist in workshops, general and thematic guided tours, or actual specially designed programmes. The approach to scientific topics and content, while detailed and specific, is consistently dynamic and interactive to encourage better learning. This is the type of activity in which the Botanical Garden has invested most in terms of promotion and raising awareness over the last ten years; it is an area in which it has gained what can now be described as strong experience and which has earned it recognition from schools.

On the school programmes front, the Permanent Events Office (*UEP*)/Communication and Marketing Area (*ACOM*) have also been running the University's dissemination project *Science4All Scuole* since 2022, designed to promote a science culture: from October to November every year, the University opens the doors of its lecture halls, laboratories, libraries and museums to primary and secondary school pupils to fuel their knowledge and curiosity and provide food for thought on a range of subjects (see Action 10).

Educational activities also include **lifelong learning** aimed at adults and target audiences in a whole range of different categories, such as:

- experts;
- groups with special learning needs and/or on rehabilitation and integration pathways;
- teachers;
- accredited tour and nature guides;

In real-world terms, activities are structured into single events or thematic itineraries, and may include guided tours, specialist seminars, workshops, courses and conferences.

Much work has gone into developing these kinds of activities over recent years, with huge scope for further expansion and diversification, especially in terms of appealing to new target audiences (for example, tour operators, businesses, professionals) identified by the Education Programme. Direct actions in this sense — which may include actions prompted by stakeholders taking part in focus groups convened to work on the Management Plan (see Annex 6) — are being planned for the coming period (see Action 15).

A specific measure, aimed at teachers, was initiated in 2023 through the implementation of *A scuola di Natura*: a project in which nature becomes a space for connecting with others, a source of discovery and wonder and a proving ground for new approaches to be applied in the classroom to supplant the traditional educational model based on transferring notions in traditional teacher-facing lessons.

The **educational play activities** serve recreational and educational purposes, leveraging learning experiences in a setting of exchange and entertainment to bring people together. The aim of these activities is to provide the public with food for thought around the Site's core themes, leaving more room for hands-on experimentation and for engagement. Put on during festivals, major events and exhibitions, they traditionally target children and families, though the experience of recent years has shown they are very popular with adults, too, opening up new opportunities for the programme's expansion.

Educational activities comparison between 2014 and 2024

2014	2024
Guided tours and educational workshops services not available	**1,696** rounds of guided tours **213** educational workshops **1** training course for teachers **1** training and refresher course for museum service operators **3** Cultural events as part of the annual programme of activities (*Risvegli*, *Estate all'Orto*, *Science4All*)

PERSONNEL AND OPERATOR TRAINING

The training of the Botanical Garden's personnel and operators is now systematic, wide-ranging and structured by means of specific courses aimed at: **in-house personnel**, **personnel working for cooperatives contracted to provide visitor services**, **nature guides**, with the aim of increasing their familiarity with the Site.

For personnel working for cooperatives contracted to provide visitor services (ticket office, surveillance, security and visitor reception), a training course is delivered to develop greater understanding of the Site's cultural content, together with modules on communicating with the public, the visitor rules and code of conduct, and how to interact with people with special needs and/or cognitive impairments. Personnel are expected to attend an initial course and yearly refresher courses.

Guides — who are required to have a specialist qualification (licence to operate as a nature guide) and/or university education in the field of natural sciences and to know at least once foreign language — are provided with specific training focused on the reasons that earned the Site its UNESCO designation and on its distinctive outstanding values, and providing information on the living collections, on the Site's historic structures and on the research work performed within the Garden. Personnel are expected to attend an initial course and yearly refresher courses.

Gardeners, who tend the heterogeneous collection of living plants every day, are required to hold a qualification in cultivation techniques and plant health care for species native to temperate, tropical and subtropical climes. Following hiring, this qualification is supplemented with an initial training period with regular refreshers and/or specific courses (on developing cultivation and/or maintenance techniques).

The **curators of the living and/or Museum collections** have qualifications in the field of botany and natural sciences and specific expertise in specimen conservation, cataloguing and handling. Ongoing training is delivered regularly by means of specific courses on the relevant subject matter and attendance of scientific conferences.

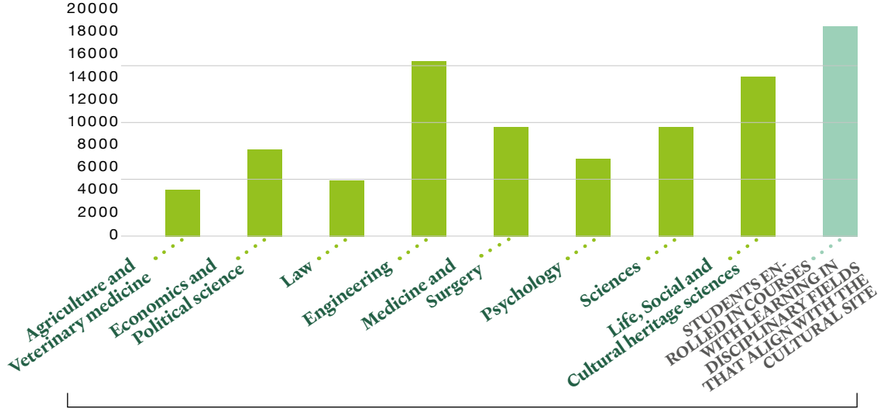
During the preparation of the Management Plan, a questionnaire was used to gauge how much people involved — in their various capacities —in the Botanical Garden's conservation, management, communication and use by the public actually know about the World Heritage Site's values. The findings show widespread awareness of the existence of the UNESCO designation, while they also reveal that knowledge as to the contents of the Statement of Outstanding Universal Value and Site boundaries vary significantly. In light of this, training is planned for all personnel to specifically focus on this subject, and is due to be repeated at regular intervals (see Action 15).

2.4.2 TEACHING

Over the course of its almost five centuries of operation, the Garden of Padua has witnessed the evolution of botany, from a science applied to medicine to a pure science through to its fragmentation into numerous specialist disciplines.

Its original function as an **open-air laboratory** is still of particular relevance today in the field of natural sciences, agricultural and forestry sciences, pharmacy, and herbal techniques, with disciples that range from biology to physiology and plant pathology, from general and systematic botany to genomics, from dendrology to entomology, from ecology to ethnobotany, and from pharmaceutical botany to applied biotechnologies. Furthermore, its extraordinary cultural dimension is the subject of studies in the fields of architecture and cultural asset management, while it is a source of inspiration for teaching projects in the humanities arena (from literature to philosophy through to applied arts).

Comparison between Unipd school students/students enrolled in courses with learning in disciplinary fields that align with the cultural site (2023-2024 period)



Agriculture and Veterinary medicine	3842	Psychology	6491
Economics and Political science	7342	Sciences	9035
Law	4343	Life, Social and Cultural heritage sciences	13946
Engineering	15884	STUDENTS ENROLLED IN COURSES WITH LEARNING IN DISCIPLINARY FIELDS THAT ALIGN WITH THE CULTURAL SITE	18530
Medicine and Surgery	9903		

2.4.3 RESEARCH

As of the 2025-2028 period, the Botanical Garden University Centre has a three-year plan in place (*Orto Research Program Strategic Plan, 2025-2028: Advancing Plants Biodiversity, Resilience and Conservation Research*, see Annex 8) that sets out its priorities and implementation plan for research and development initiatives. The Plan has been drawn up by an internal multidisciplinary working group, which brings together both scientific expertise and skills associated with the dissemination of research findings.
The Garden's mission is to study, document and promote the knowledge and sustainable use of plant diversity, as well as to better understand the importance of plants for the wellbeing of all ecosystems and for supporting human society.
In order to implement this programme (see Action 16), three interconnected priorities have been identified, each pursuing a general goal:

1. **Biodiversity**, with the goal of making a significant contribution to initiatives for the protection of global biodiversity.

2. **Resilience**, with the goal of innovating research on the response of plants to environmental stresses and climate change.

3. **Conservation**, with the goal of becoming a recognized leader in conservation initiatives.

BIODIVERSITY

Biodiversity, the rich variety of lifeforms on the Earth, is key to the stability and resilience of ecosystems. It supports everything, from the nutrient cycle to water purification, from pollination to climate regulation. This diversity also forms the very foundation of farming systems and pharmaceutical industry production, providing a vast array of resources. Nonetheless, an estimated two thirds of the world's biodiversity is currently under threat, and its potential loss could not only jeopardize the natural world, but human health and economies, too. With that in mind, the Garden's Research Programme focuses on developing innovative and more detailed scientific methods to study plant biodiversity in the various ecosystems, assessing the impact of climate change and human activities to find solutions that protect our planet's wealth of biological resources.
Specific goals:

- to map biodiversity on a spatial and temporal scale;
- to identify biodiversity models and dynamics in vulnerable ecosystems;
- to analyse the Botanical Garden's collections historically.

RESILIENCE

Plants' survival depends on their ability to respond and/or adapt to environmental conditions; an ability that is becoming more and more crucial in the face of climate change and habitat deterioration. Investigating and documenting how different species acclimatize and adapt to various environments is key to understanding their resilience. Through this research, we can identify the strategies that plants use to cope with stress, while it also helps us predict which species are more likely to thrive or decline in changing conditions. This knowledge is essential to develop conservation strategies that improve the adaptability and survival of plant species in their natural habitats.
Specific goals:

- to understand the functional-morphological properties of plants, how they adapt to different environmental factors and their potential to withstand climate change;
- To investigate the functional strategies employed by plants to acquire water and utilize said water resources.

CONSERVATION

The knowledge gained in the former two domains forms the basis for conservation and biodiversity growth efforts within parks and protected areas (*in-situ* conservation); for exploring the genetic potential of species (germplasm) through the creation of seed banks; and for reintroducing plants (*ex-situ* conservation) into areas affected by climate change and by harmful phenomena associated with human activities. These efforts are in line with the goals set by the EU's Biodiversity Strategy for 2030 and Biodiversity Research Policy (which is part of the EU's Research and Innovation Programme) for improved ecosystem *conservation*.
Specific goals:

- to strengthen the Gene Bank for conservation of plant genetic material;
- to conserve microalgae and fungi ex situ;
- to improve genomic practices to enhance conservation efforts.

The specific goals are pursued, for each priority, by implementing one or more projects run by relevant working groups.

Information and updates on research projects currently in progress can be accessed under the "research" section of the Botanical Garden's institutional website (ortobotanico1545.it/en/research-and-collections).

2.5 Visitor facilities, dissemination and promotion (COMMUNICATION)

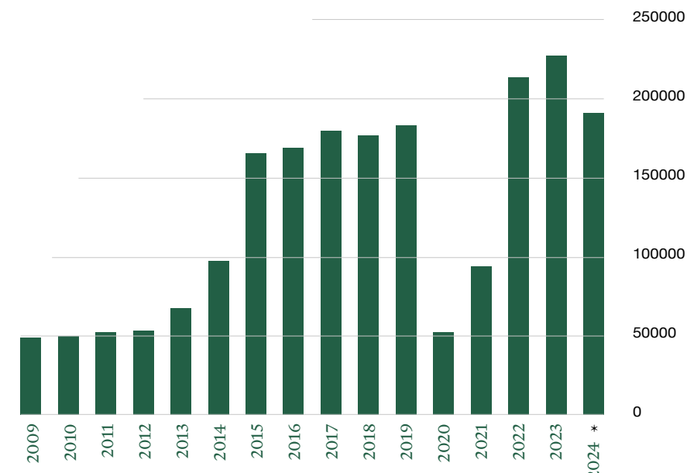
2.5.1 VISITOR FACILITIES AND ACCESS

The Botanical Garden is usually open to the public for more than 300 days/year and visitors can make their own way around the Site, with or without the aid of audio guides, or can join a guided tour.
The numerous activities held (scientific conferences, educational activities, exhibitions and events) make up an impressive dissemination programme that seeks to raise awareness among the target communities around topics that are inherent to the World Heritage Site.

With the extension of visitor routes, improvements in the quality of services with the extension of opening hours and days, and the development of educational activities, events and festivals, there has been a steady and significant increase in visitor numbers over the last 15 years, reaching an all-time record high of 227,305 admissions in 2023, cementing the Botanical Garden as a nationally and internationally renowned cultural landmark for the region.

Botanical Garden Admissions trend 2009-2024

Year	admissions
2009	49359
2010	50361
2011	52762
2012	53628
2013	68033
2014	97807
2015	166287
2016	169095
2017	180026
2018	177084
2019	183422
2020	53242
2021	94649
2022	213965
2023	227305
2024*	191210



*Biodiversity Garden greenhouses closed to public due to works

The Site has a visitor centre, which is home to the ticket office and bookshop. The need for an appropriate reception area for incoming visitors, providing them with information on how to get the most out of their visit, together with the need for interpretation boards and/or other tools to help them enjoy a more in-depth experience, resulted in the creation of a multifunctional space in 2014, featuring interactive maps for exploring and discovering the Garden. The building, whose interior design features timber elements, is located in a space on the edge of the Garden, looking over the waters of the Alicorno canal, and presents visitors with a glass-clad block that they walk through.

Between 2014 and 2016, the visitor centre also housed a cafeteria. The spaces designated for the cafeteria proved unfit for purpose, calling for the rooms inside the Biodiversity Garden's service building to be completely rearranged to accommodate the facility (2021-2022). However, the temporary closure of the Biodiversity Garden greenhouses, next to the new eatery, meant the service could not start until the building's renovation work had been completed (see Action 23).

The Biodiversity Garden's service building also houses conference and event spaces, featuring an auditorium with a variable seating plan (seating between 170 and 350), a multifunctional space and a foyer, which are used for appointments, exhibitions and initiatives on the Garden's cultural calendar, as well as conferences and events organized by public and private third parties on a concession basis.

The Botanical Garden's education programme has access to a suitably appointed space in one of the Biodiversity Garden's greenhouses and, since 2023, to a multifunctional venue belonging to the historic Herbarium's facility.

ACCESS

The Botanical Garden is located in Padua's old city centre; it is easy to each by car or using local public transport (bus or tram). The Site has car parks for staff, contractors carrying out maintenance and event organizers.
There are various municipal paid parking areas available in the immediate vicinity as well as on-street parking along neighbouring roads (free and paid). The Garden has bike stands for use by staff and visitors.

Signs have been placed by the Local Council on the main roads leading to the Botanical Garden providing directions to the Site for those travelling on foot and by car. Furthermore, the local tourism promotion and sustainable mobility project — established in collaboration with Padua City Council entitled "Padua City of Art and Science" *(Padova città d'arte, Padova città della Scienza)* — has boosted the visibility of the facility, as well as the city's other World Heritage Site, by introducing advertising

billboards as a distinctive feature on tram shelters along the city's main north-south line (see sect. 2.5.3).

The plaque celebrating the Site's inscription on the World Heritage List is located at the main entrance.

ACCESSIBILITY FOR PEOPLE WITH SPECIAL NEEDS

The Botanical Garden as a whole is accessible to visitors with impaired mobility, and guide dogs for the blind are allowed to enter.
The Garden has access ramps in and out of the visitor centre and Botanical Museum, and has lifts for accessing the historic Herbarium, Library and Science Operations offices. Lifts also provide access to the research laboratories and the viewing deck on the first floor of the Biodiversity Garden's service building.
There are some limitations when it comes to entering specific areas of the 16th-century Garden, which has restricted access due to the size and configuration of the internal paths, which are not wheelchair friendly.
There are two internal car parks for use by visitors with special needs, on request; there are also two wheelchairs available from the visitor centre to cater to visitor requirements.

For the visually impaired, there are lecterns all along the outside walking paths through the Arboretum written in braille explaining the name and origins of each plant. The blind and visually impaired route, comprising flower boxes placed at head height filled with potted plants, allows visitors to interact with a selection of plants chosen for this specific purpose. A tactile map is located at the entrance to the Site.
Tactile botanical models have also been procured to increase the ability of all members of the public to experience the plants, tying in with a "for all" approach.

Through specific projects, the Site has renovated certain tools in recent years to make the visitor experience even more accessible:

- the app has been integrated with a number of visitor routes using Italian sign language (video) and spoken tours (audio);
- innovative and inclusive visitor initiatives (*silent play*) have been delivered;
- multilingual audio guide (including a text version) and AudioPen Kids tools have been developed;
- a hardcopy AAC (Augmentative and Alternative Communication) guide has been produced for the cognitively impaired.

Special multisensory tours are organized, on request, in collaboration with local bodies and associations.

The cultivation of ongoing relationships with certain bodies (Italian Blind Association (*UICI*); Hollman Foundation; Italian National Agency for the Deaf (*ENS*), and others) — fostered by participation in the focus groups established to work on the Management Plan (see Annex 6) — has enabled the Garden to launch specific training projects for guides and reception personnel and define co-designed visitor routes, with the aim of turning experiences into structural actions for the cultural Site (see Action 15).

PEBA — **Architectural Barrier Elimination Plan** (see Annex 9), completed in February 2025 — looks into the level of accessibility of the Garden as a whole in great detail, not just from a physical point of view, but also in cognitive and sensory terms with regard to access by outside visitors and relationships with the surroundings (website and routes), information and visitor services, horizontal and vertical distribution (buildings and open spaces), the museum experience and safety. The Plan defines precise measures to be carried out in the medium and long term aimed at improving the Site's accessibility in terms of both building work and management, based on criteria that adhere as closely as possible to the overall design criteria, with each assigned a level of priority (see Action 17).

A project submitted for funding under Italian law *Legge 77/2006 EF 2024* (see Action 18) has presented an important opportunity to take a systematic look at what additional tools and initiatives can be implemented with a view to overcoming obstacles preventing people with disabilities from visiting the Botanical Garden and what can be done to achieve a general improvement in user experience for all visitors, adopting an inclusive approach.

2.5.2 OUTREACH AND DISSEMINATION

The activities conceived and organized by the Botanical Garden for visitors — with the main goal of sharing scientific content of the highest calibre with a wide and varied audience, at the same time promoting the recognized values of the World Heritage Site — fall into a number of different main categories:

- **cultural events** with science dissemination meetings, workshops, performances, special tours and creative activities all designed to help attendees discover the plant and natural world (*Risvegli* spring festival);
- **seasonal programme** with events mainly based on educational play and experiential activities (summer and Christmas events *Estate all'Orto*, *Natale all'Orto* respectively);
- **the annual programme** *Racconti della Natura*, with presentations of books revolving around the theme of writing as a favoured means of telling people about nature, and opportunities to meet the authors and experts;
- **special events**, linked to certain special occasions (Earth Day, International Day for Biological Diversity, Tree Day; Fascination of Plants Day);
- **shows**, **exhibitions** and **installations** that bring together art and science, nature, the environment and landscape;
- **participation** in the University's events (Science4All) and collaboration with the city's key festivals (CICAP Fest) or festivals of local or national significance.

Depending on the type and season, events and activities are held in the Garden's indoor and/or outdoor spaces, including the Herbarium and Library, which are incorporated into the initiatives, offering special tours and temporary thematic exhibitions curated by the relevant personnel. During major events, gardeners and researchers working in the Garden's laboratories also collaborate on the programme aimed at the visiting public with dissemination activities.

Special projects are developed in collaboration with key partners of national and international significance in order to promote the Site's content and values, which also includes targeting new audiences. Notable projects include:

- site-specific performances co-produced with arts festival *OperaEstate Festival Veneto*;
- participation in the Italy Pavillion at the Venice Biennale of Architecture (2021);
- shows and exhibitions co-produced with the exhibition of contemporary art *Arte Sella*;
- collaboration on the Rai Cinema production of the observational documentary *Bestiari, Erbari, Lapidari*, premiered at the 81st International Film Festival organized by the Venice Biennale (2024).

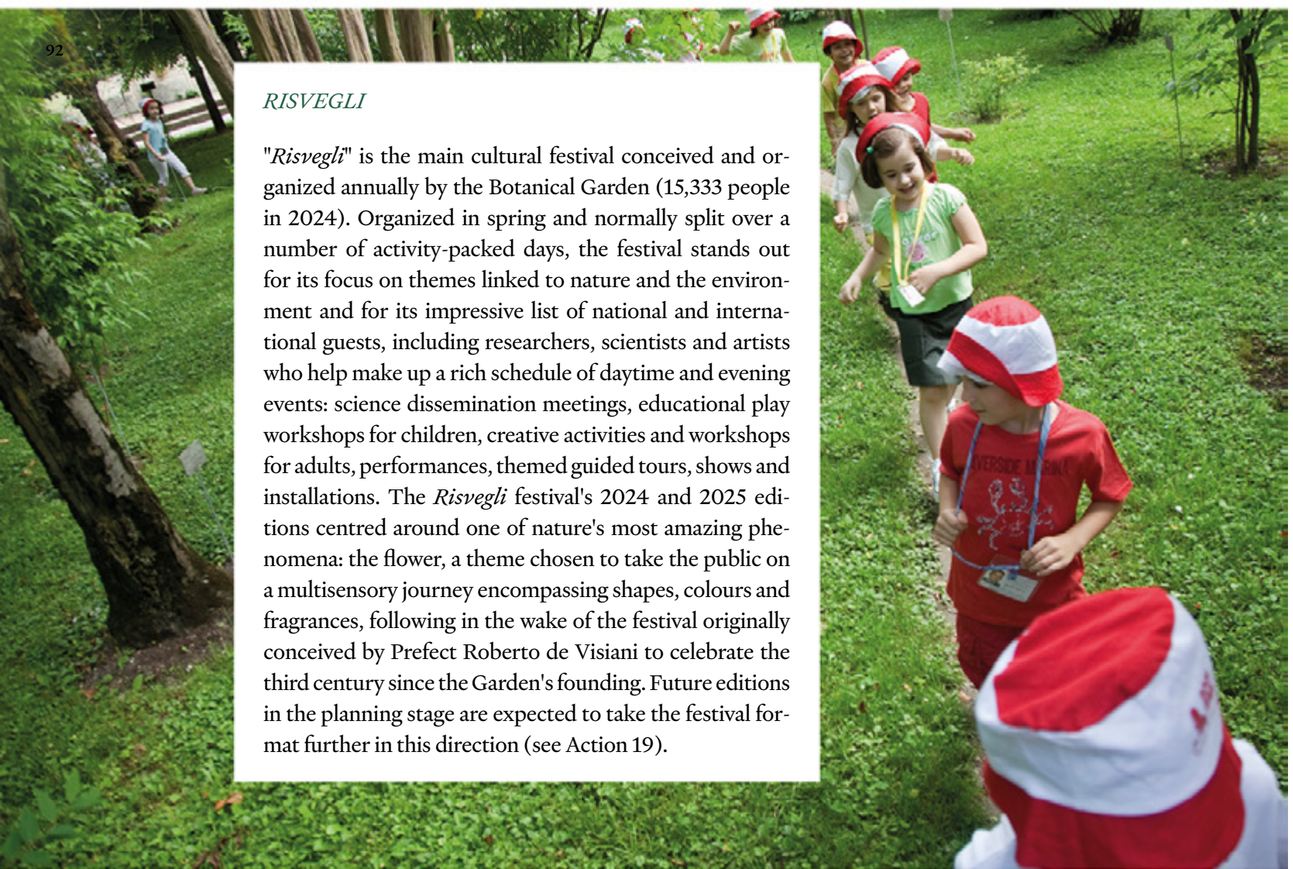
The Botanical Garden is also open to considering projects promoted by local cultural bodies and associations sharing themes and values of mutual interest that tie in with the goals of the annual programme of activities (see Action 11 and Action 20).

The promotion measures taken at the Botanical Garden are supplemented with the leasing of spaces and rooms for holding events organized and promoted by third parties, for which both regulations and fees apply. While said events may not have specific dissemination or educational goals per se, they nonetheless represent an important opportunity to raise the profile of the Botanical Garden and awareness of its values among other audiences (conference attendees, businesses) who take walks and guid-

ed tours and purchase gadgets and publications during the events, the main aim of which is to pursue the mission of promoting the Site and not using the Garden just as a mere event venue.

In 2024, the Botanical Garden, alongside other University departments, embarked on a path to event certification in accordance with the requirements and guidelines set out in international standard ISO 20121:2024 "*Event sustainability management systems. Requirements and guidance for use*" in order to keep driving efficiency and sustainability decisions, which are at the basis of all the activities carried out (see Action 24).

The outreach and dissemination activities organized by the Garden are described, and updated regularly, on the website (ortobotanico1545.it/en/events-and-activities).



RISVEGLI

"*Risvegli*" is the main cultural festival conceived and organized annually by the Botanical Garden (15,333 people in 2024). Organized in spring and normally split over a number of activity-packed days, the festival stands out for its focus on themes linked to nature and the environment and for its impressive list of national and international guests, including researchers, scientists and artists who help make up a rich schedule of daytime and evening events: science dissemination meetings, educational play workshops for children, creative activities and workshops for adults, performances, themed guided tours, shows and installations. The *Risvegli* festival's 2024 and 2025 editions centred around one of nature's most amazing phenomena: the flower, a theme chosen to take the public on a multisensory journey encompassing shapes, colours and fragrances, following in the wake of the festival originally conceived by Prefect Roberto de Visiani to celebrate the third century since the Garden's founding. Future editions in the planning stage are expected to take the festival format further in this direction (see Action 19).

Events and Festivals 2016-2024

Year	Scientific conferences	Institutional events	Cultural events	Leasing of spaces for commercial events	Total no. of events	Total no. of participants
2016	27	15	6	10	58	11,500
2017	45	24	9	20	98	14,168
2018	30	31	30	28	119	16,224
2019	43	31	33	17	124	18,855
2020 (*)	6	6	12	1	25	(**)
2021 (*)	0	2	23	0	25	(**)
2022 (***)	36	11	29	14	90	8,691
2023 (***)	22	10	22	1	55	4,818
2024 (***)	20	12	34	7	73	4,675

(*) Covid-related restrictions on events
(**) participants in individual events are included in the number of visitors and cannot be counted separately
(***) restrictions on events due to building work in event spaces

2.5.3 INFORMATION AND PROMOTION

The Botanical Garden employs an integrated communication strategy, which incorporates both *online* and *offline* tools to inform different target audiences and promote services, activities and research projects, at the same time raising awareness around the values that have earned the Site World Heritage status.

The information and promotion tools and measures have been scaled up and diversified over the last ten years, with a lot of the development happening between 2022 and 2023, coinciding with the Botanical Museum being opened to the public. This initiative prompted the integrated redesign of visitor routes and hence the associated information and communication tools in order to strengthen the link between the

original garden *Hortus Simplicium* and the modern Biodiversity Garden. The new visitor information tools promote the UNESCO Site as an organic location, the cradle of science and a place with a long history of exploring relationships between nature and culture.

VISITOR INFORMATION TOOLS AND SERVICES

Visitor information tools are located across the Site or can be found in the bookshop and/or visitor centre:

- **Paper map of the Botanical Garden**. The map features a simplified plan of the Site, identifying the different areas making up the Garden and the main highlights. A copy is available to all visitors free of charge.
- **Interactive maps in the *visitor centre.*** Two touchscreens are located at the entrance to the Site in the visitor centre, designed to allow visitors to get their bearings as they enter and cement what they have learned as they leave, incorporating a variety of information on areas, services and events.
- **Tactile map**. Designed to reinforce the inclusivity and accessibility of the visitor experience. Located at the start of the visitor route, it helps all visitors find their bearings.
- **Audio guide**. A route divided into eighteen stages, lasting one hour, available in different languages. It is free to download onto your smartphone.
- **AudioPen Kids**. This free tool is designed for children to use. With the map and the points of interest marked on it, the tool provides an interactive way of visiting the Botanical Garden.
- **Augmentative Alternative Communication guide (CAA).** This is a tool designed to tell visitors about the Botanical Garden in a clear, easy-to-understand and accessible way. It is particularly useful for children who have specific learning disabilities (SLD), cognitive difficulties or who have not learned to read and write; for children and adults who are not native Italian speakers; for people with cognitive disabilities or autism; as well as for elderly people who need information that is easy to understand.
- **Botanical Museum, Library and Biodiversity Garden information and interactive systems.** Brief descriptive panels are used to illustrate contents, describing their history, collections, areas and themes, providing starting points that can be explored further through guided tours, the hardcopy guide or the website. The exhibition spaces offer digital and interactive experiences provided in Italian and English.

In this regard, the **plant identification signs** deserve a special mention. Placed next to every single plant throughout the Renaissance Garden, they bear the name of the species, family and region of origin (in addition to possible applications for medicinal plants and the date of introduction for historical plants). For key species, the sign is also written in braille. This is a historical information tool addressed with an innovative development project (see Action 18).

In addition to these tools, there are a number of **publication projects** delivered by and on behalf of the Botanical Garden. These include the most basic, yet still significant **official guide** to the Botanical Garden (published by Marsilio editore). Another guide for sale is the **guide to UNESCO Sites** *Tesori d'Italia e l'Unesco* (published by Sagep), while a more exhaustive publication packed with images and in-depth insights, in the shape of an illustrated catalogue, is the volume entitled ***Hortus Mirabilis*** *– alla scoperta del più antico orto botanico del mondo* (illustrated books published by Rizzoli). Lastly, a series of books for the dissemination of scientific knowledge has been produced for children: ***The Garden's books***. The importance of biodiversity and the commitment to sustainable management of resources, the role of plants in our lives, botany and gardening notions and experiments are the subjects covered by the eight books in the series produced with Editoriale Scienza, a publishing house specializing in communicating science to children and multi-Andersen award winner, also sold in bookshops. Trials of these products, first started in 2022, have produced positive results, prompting us to look at how we can take projects in this field even further (see Action 23).

The arsenal of tools includes the standard yet key visitor service, the **guided tour**, which is strongly promoted by the Botanical Garden as it delivers a richer and fuller experience. Aimed at individuals, pupils across all categories and levels and groups of tourists, the tours — which offer general and themed options — are led by the Botanical Garden's nature guides and conducted in different languages. Special guided tours are organized when conferences and events are on, to accommodate guests and personalities, and to help people with special needs take part.

ONLINE COMMUNICATION

The main online communication tool is the Botanical Garden's **institutional website**(ortobotanico1545.it), which was overhauled in November 2024. Available in Italian and English, it illustrates the reasons that determined the Botanical Garden's inscription on the World Heritage List, its history and its collections. The site, which is updated daily, provides detailed information on place, services and visiting procedures, the educational offering, the cultural events calendar, and what studies, research and projects are in progress. It is produced following the guidelines published by Italy's digital innovation agency (*AGID*); it features visual content, easy-to-understand language, and easy-to-read text.

Between 2024 and 2025, while the new website was being developed, the new **app** was also designed, integrating all the Garden's various areas in a single overarching visitor route.

Lastly, the online communication strategy is integrated with the use of **social media networks** (Facebook, Instagram, YouTube), each used to capture and inform specific categories of users.

The one-stop booking centre, which the Garden shares with the University's other cultural sites (Museum of Nature and Humankind, Palazzo del Bo and Villa Parco Bolasco), operates every day from 9am to 5pm and is the last component in the public information service, providing information on bookings, tours, educational activities, and events.

Main communication figures

Website (average/year for 2014-2024 period)	
555,294 page views	123,813 unique visitors
Social medial channels	
29,064 facebook followers	22,100 instagram followers
Other profiles	
Tripadvisor 2,437 reviews (average rating 4.5)	Google 6,159 reviews (average rating 4.6)
Mentions in the press (average/year 2014-2024)	
>300/year in local, national and international press relating to events, shows, news and interviews on print media, radio and TV and on local, national and international online publications (source: University of Padua Press Office)	

CAMPAIGNS, PROJECTS AND OTHER PROMOTIONAL MEASURES

The Botanical Garden develops ad hoc communication campaigns for specific events and collaborates with the University of Padua's Communication Department to ensure adequate coverage of events and activities that involve the whole University and university museums. It also implements promotional measures for individual scheduled events, either directly or in collaboration with other institutional partners, and plans integrated initiatives with the Museum of Nature and Humankind.

The local tourism promotion project, undertaken jointly with Padua City Council, was implemented between 2024 and 2025 and involved introducing advertising billboards as a distinctive feature on tram shelters at the stops on the route leading to the city's World Heritage Sites, along the city's main north-south line. An opportunity to raise the profile of two UNESCO Sites and promote a highly complementary cultural offering of outstanding value that is the only one of its kind anywhere in Italy or on the international scene.
The promotional measure — complemented with transit advertising involving the temporary coordinated wrapping of vehicles on the line in question — can be seen as the first core action in a wider local collaboration project that brings together the University and Local Council in an undertaking entitled "Padua City of Art and Science" (*Padova città d'arte, Padova città della Scienza*, see Action 21).

Activities concerning the cultural Site's image management play a particularly important role in these communication actions and include liaising with the media, in concert with the University of Padua's Press Office, and licenced use of the image, for which both regulations and licence fees apply.
The aim of these actions is to protect the Botanical Garden's image and cultural values, disseminate the UNESCO Site's cultural content, and strike a balance between conservation, research and promotion themes.

BRAND IDENTITY

In recent years, the Garden has put a brand identity action in place, which has resulted in the creation of a logotype — designed to merge tradition and modernity in a distinctive design — and a pictogram, which is a stylized take on the key features of the Botanical Garden's historic plan (from the book *L'Horto de i semplici di Padoua* by Girolamo Porro dated 1591).

The World Heritage Site logo appears alongside the Botanical Garden's own logo on official documents and publications, reproduced in compliance with the guidelines and procedures set out by the World Heritage Centre responsible for brand licencing.

The Botanical Garden's logotype and pictogram are featured on every communication tool (website, app, digital graphical material) and new graphic designs have been created drawing on these brand elements and used on merchandise for sale from the bookshop.

With different versions featured on gift shop goods and publications, they take inspiration from a famous quote attributed to J.W. Goethe — Nature…creates ever new forms — and have been developed into a historical line — aimed at promoting and communicating the vast documentary heritage belonging to the Botanical Museum and Library with educational artwork, illustrations and vintage images — and a modern geometric line, which gives a new take on the pared-back forms of the Renaissance Garden (see Annex 10 and Action 23).

2.6 Critical issues and priorities

An analysis of the Botanical Garden's current state in terms of both conservation and promotion and enhancement activities highlights the changes and developments it has witnessed, especially over the last ten years, while also bringing to light specific critical issues associated with each component, as summarized below.

STRATEGIC OBJECTIVE	CRITICAL ISSUE
Conservation	• Development pressure due to its location in a densely populated city (see sect. 2.2.1) • Vulnerability of collections to attack by microorganisms and parasites (see sect. 2.2.2a). • Deterioration factors affecting ancient manmade structures compounded by interaction with the natural environment (e.g. biological contamination) and urban environment (see sect. 2.2.2.c). • Limited cataloguing of herbarium samples (see sect. 2.2.2.d). • Fragility of the archival and bibliographical heritage (see sect. 2.2.2.e). • Risks from extreme events (see sect. 2.2.3)
Community	• Sporadic interaction between the Botanical Garden and local bodies and associations (see sect. 2.3.2) • Community engagement policy to be stepped up (see sect. 2.3.2)
Capacity Building	• Need to strengthen relationships with the local community and institutions for reintroduction *in situ* (see sect. 2.3.3) • Knowledge of reasons for UNESCO designation not consistent across personnel (see sect. 2.4.1) • Infrastructure and spaces insufficient for projects that entail *ex-situ* propagation of species and reintroduction back into the environment (see sect. 2.4.3)
Communication	• Physical accessibility restricted in some cases (see sect. 2.5.1) • Seasonal nature of tourism demand (see sect. 2.5.1) • Limited amount of space available for developing new initiatives (see sect. 2.5.2)
Credibility	• High turnover of human resources in research project field (see sect. 4.1). • Complexity of adapting administration/accounting tools to suit management of a cultural site (see sect. 4.2). • Significant level of general expenses for living heritage conservation and maintenance (see sect. 4.3).

1. Stefano Bombardieri for exhibition event *Estinzioni. Storie di animali minacciati dall'uomo* highlighting the plight of endangered animals (2017) **2.** Davide Quayola, *Seconda natura* exhibition (2019) **3.** Alessandro Melis, *Spandrel*, Venice Biennale of Architecture 2021 **4.** Michele De Lucchi, *Radici al vento, testa nella terra* installation (2019) **5.** trilateral meeting with *Kew Royal Botanic Gardens* and *Singapore Botanic Gardens* (2024) **6.** Stefano Mancuso in *Botanica*, part of the *Risvegli 2018* festival **7.** *OPV* Orchestra of Padua and Veneto, *Risvegli 2021* festival **8.** educational and science dissemination activities, *Risvegli 2025* festival