

## **Plants in the spotlight. A botanic garden display of Red List species supporting the 2010 International Year of Biodiversity.**

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### **Abstract**

The historic Hortus Botanicus Amsterdam boasts an exhibit of fifty threatened plants during the International Year of Biodiversity 2010. A stunning 144 page catalogue called 'Plants in the Spotlight' includes habitat pictures, stories, maps and conservation facts on each imperilled plant. Approaching each species as a 'personality' with its very own 'life story' gives visitors an excellent view into the world of threatened plants that often remain overlooked. When looking at fifty individual species from across the globe, a variety of conservation issues become apparent. The catalogue serves is both an attractive must-have for visitors and for educators it is a toolbox filled with examples for environmental education.

### **Introduction**

The Earth is currently facing an extinction crisis of unparalleled extent. To give clarity to the pace and nature of these extinctions, the International Union for the Conservation of Nature (IUCN) annually composes and publishes the IUCN Red List of Threatened Species. This list presents an educated estimate of the extinction risk for each evaluated species. Against the current extinction crisis, the United Nations have declared 2010 the International Year of Biodiversity. This resulted in several international, national and local initiatives to create momentum for public awareness and action to save biodiversity.

As the diversity of plants, the green sustainers of our food chain and climate, is the core activity for botanic gardens, these institutions are due to play an obvious role in safeguarding and showing the value of biodiversity. The role of botanic gardens in this context has been proposed in detail by Botanic Gardens Conservation International (BGCI) through a number of reports and guidelines - like the Gran Canaria Declaration, The International Agenda for Botanic Gardens in Conservation and the Global Strategy for Plant Conservation (GSPC).

The Amsterdam Botanic Garden has been devoted to the study of plants since 1638. During those 370-odd years it has built up an impressive history in tandem with many important geopolitical events related to the activities of the once great trading city of Amsterdam. This eventful, international history is captured on a three acre site which sits like a jewel in the city centre, delighting thousands of visitors monthly, and entrusted to an independent foundation funded by ticket sales and municipal contribution. In 2010 the garden's main strength lies in converting the rich history and high visitor numbers into outreach for plant conservation. It is a story-telling garden, best equipped to meet the GSPC Target 14 on communication, educational and public-awareness programmes illustrating the importance of plant diversity and the need for its conservation.

### **What is biodiversity?**

Biodiversity may seem easy to define: the extent of variation within life on earth. However, the first challenge appears when one attempts to express or measure this variation. Are we losing a number of species, genera, or families, or is the amount of variation lost below the species level:

varieties, (sub-) populations or gene pools? Closely related to this conundrum is the question as to why biodiversity is worth the conservation effort. What is the value of different plant families, genera, species, subspecies or populations? The sheer complexity of global biodiversity makes it difficult to explain the importance of each thread in the web of life. The value of biodiversity as a whole, however, is strongly defined by the fact that it presents an inestimable number of possible benefits. Grouping these benefits into three distinct types, the following 'definitions through appreciation' for the variation of life on earth were formulated:

### *Beauty*

Appreciating beauty is a very subjective way to appreciate biodiversity. Our planet is decorated with an incredible number of organisms, from colourful flowers to towering trees. Considering the unique beauty of each species fills the fascinated observer with awe, and an urgency to act, knowing that extinction means lost forever. Already we grieve the loss of the dodo, quagga and the St. Helena olive – all gone forever. Biodiversity has an intrinsic value and may be defined as the glory of creation.

### *Use*

The myriad of species on earth, especially plants, still hold huge undiscovered promises for pharmacology. With their host of secondary metabolites, plants from all parts of the world still provide scientists with new ideas for the development of life-saving medicine. Simply, the loss of species reduces the choice of as yet undiscovered biochemical agents useful for future medicines. Of course, many plant and animal species are responsible for our health and well-being through providing food, building material, fibres and more. Biodiversity is a pool of opportunities.

### *Ecology*

One of the most important aspects of biodiversity is possibly the most difficult to grasp: ecosystem services. A species-rich ecosystem is more resilient and provides many vital services. For instance, many of our crop plants are dependent on wild bees for their pollination. These bees live in proximity of agricultural fields, if their habitat has been preserved. Another example is drinking water, often produced in well-functioning ecosystems like the Catskill mountains above New York, or the coastal dune seepages that feed the water-works of Amsterdam. A loss of species can cause a sudden collapse of an ecosystem or its service. Biodiversity is resilience.

## **Concept development**

From this backdrop of global extinctions, the Amsterdam Botanic Garden wished to play a role to present the case for conservation.

The most obvious approach in this garden would be that of looking at the individual plant species. A list of all IUCN Red List species found in our garden was composed using the very practical plant upload tool on the BGCI website. From some 200 Red Listed garden plants we made a selection of 35 individuals to form our exhibition, supplemented with 15 species that were not endangered internationally, but listed as threatened in the Netherlands. The selection was based on location in the garden, look of the plant, taxonomic group, native region and conservation issues. It was attempted to distribute all factors evenly within the final selection of species, resulting in an exhibition with a variety of plants from around the world, including cycads, conifers and angiosperms, annuals, succulents and hardwood trees; fifty species hidden throughout garden and greenhouses. Each plant was marked with a numbered, 10x11cm Red List sign attached to the conventional plant label.

## Exhibit catalogue

Showing a variety of conservation issues was important to the exhibition: addressing the relevant threats to biodiversity, ranging from habitat loss, to climate change to invasive species. But before a visitor is ready to hear the story of how badly a given species is doing in the wild and care, they first have to appreciate the unique character of that species.

To make the experience up-close and personal, the exhibition was designed to introduce plants as personalities. The fifty exhibit plants are described in a 144 page, bilingual (Dutch and English) catalogue, with two pages devoted to each species. An introductory paragraph gives each species a profile. Just as we judge a person in a first glance, a reader immediately decides if the plant is worth further attention or not. Just as an individual can strike us as charismatic, pretty, or extraordinary, so too can a plant. Perhaps it is utilitarian, has medicinal uses, plays a role in history, or encapsulates a strange beauty. Introducing plants as characters raises our curiosity motivating us toward conservation. A more traditional approach might dryly describe the number of anthers, or size of the corolla tube, for instance, followed by a scrap of information about ecology and plant use as an afterthought.

Next, the text leaps into ecology and habitat, allowing a visitor to discover more about where and how the plant lives. Specific conditions and background information help foster an understanding of the third paragraph dealing with threats and outlook. Here you will find the reasons for a plant being placed on the Red List, and whether the future situation may improve or deteriorate. This is also where various conservation issues are addressed.

Finally, an attractive picture of the species in its habitat is included, plus a distribution map of the native range and an IUCN Red List symbol with the status. As scientific names are difficult to remember, a colloquial name is always given in Dutch and English. If such a name did not exist, we inventively made one up, based on either an existing scientific or local name.

## Personalities

These plants ooze character. For example, the Wood's cycads (*Encephalartos woodii* Sander, Extinct in the Wild) are presented as the cloned sons of a lonely bachelor, who survive 'only in gardens and greenhouses' since their poor father was dug out from the wild. This story is followed by a poignant black-and-white picture from 1907 of the last wild specimen.

The Angels' Trumpet (*Brugmansia aurea* Lagerh., Vulnerable) has an ethereal face, sharing the clouds with the angels. The species is native to the Andean cloud forests in Ecuador.

The Parana pine (*Araucaria angustifolia* (Bertol.) Kuntze, Critically Endangered) too, has an interesting story to tell: the native inhabitants of the southern Brazil used to shoot arrows into her crown to dislodge her nutritious cones. A sustainer of life.

## Education tools

Seeing fifty distinct, yet interrelated stories of threatened plants yields a good overview of conservation issues. A few examples are given below.

Possible effects of climate change are explained by the dove tree (*Davidia involucrata* Baill., Vulnerable), reminiscent of the lush vegetation during the late Tertiary. Before the onset of the Pleistocene, the last great global climate change, this tree and a number of relatives were widespread throughout Eurasia and North America. Of all *Davidia*'s only the dove tree remains, endemic to central China, witness of past extinctions due to climate change.

On a barren rock off Ibiza in the Mediterranean, the endemic Margalides spurge (*Euphorbia margalidiana* (Kuhbier & Lewej), Critically Endangered) clings to the edge: the rock is prone to erosion and the plant is specifically adapted to the present climatic conditions. Changing rainfall patterns or temperatures could be fatal.

Overharvesting of plants for medicinal purposes continues to be a problem, as can be seen in Arnica (*Arnica montana* L., endangered in the Netherlands) Although still common in the mountains of Western Europe, its trade has already been restricted by CITES appendix D.

For other, more vulnerable species like Lignum Vitae (*Guaiaecum officinale* L., Endangered) it is already too late. Renowned for its resin used to treat syphilis, the unsustainable harvesting of the trees since 1492 has led to near-disappearance of this Caribbean species from the wild.

The danger of invasive plants and animals to existing ecosystems becomes ever more evident. Invasive species can penetrate ecosystems through and through, obliterating their food species or the less vigorous native counterparts. Since the introduction of rabbits on Round Island near Mauritius, the bottle palm (*Hyophorbe lagenicaulis* (L.H.Bailey) H.E.Moore, Critically Endangered) has almost become extinct as seeds and seedlings were systematically devoured by the introduced aliens. Now, after successful eradication of the Round Island bunny squad, the palms are returning to the landscape!

Also invasive plants can have a deleterious effect on the natural species composition. The white-topped pitcher plant (*Sarracenia leucophylla* Raf., Vulnerable) in the south eastern United States is suffocated by expanding mats of Chinese kudzu vine (*Pueraria lobata*).

## Conclusion

The exhibit 'plants in the spotlight' offers both an alluring glance into the world of plants, whilst also providing educators and tour guides with a practical toolbox full of examples to explain the main triggers of current biodiversity loss. Examples of plant species, alive and kicking in the Botanic Garden of Amsterdam.

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## Literature

Planten in de hoofdrol / Plants in the spotlight  
Rolf Roos, Joke 't Hart, Reinout Havinga, Michael Sawyer and Hanneke Schreiber  
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