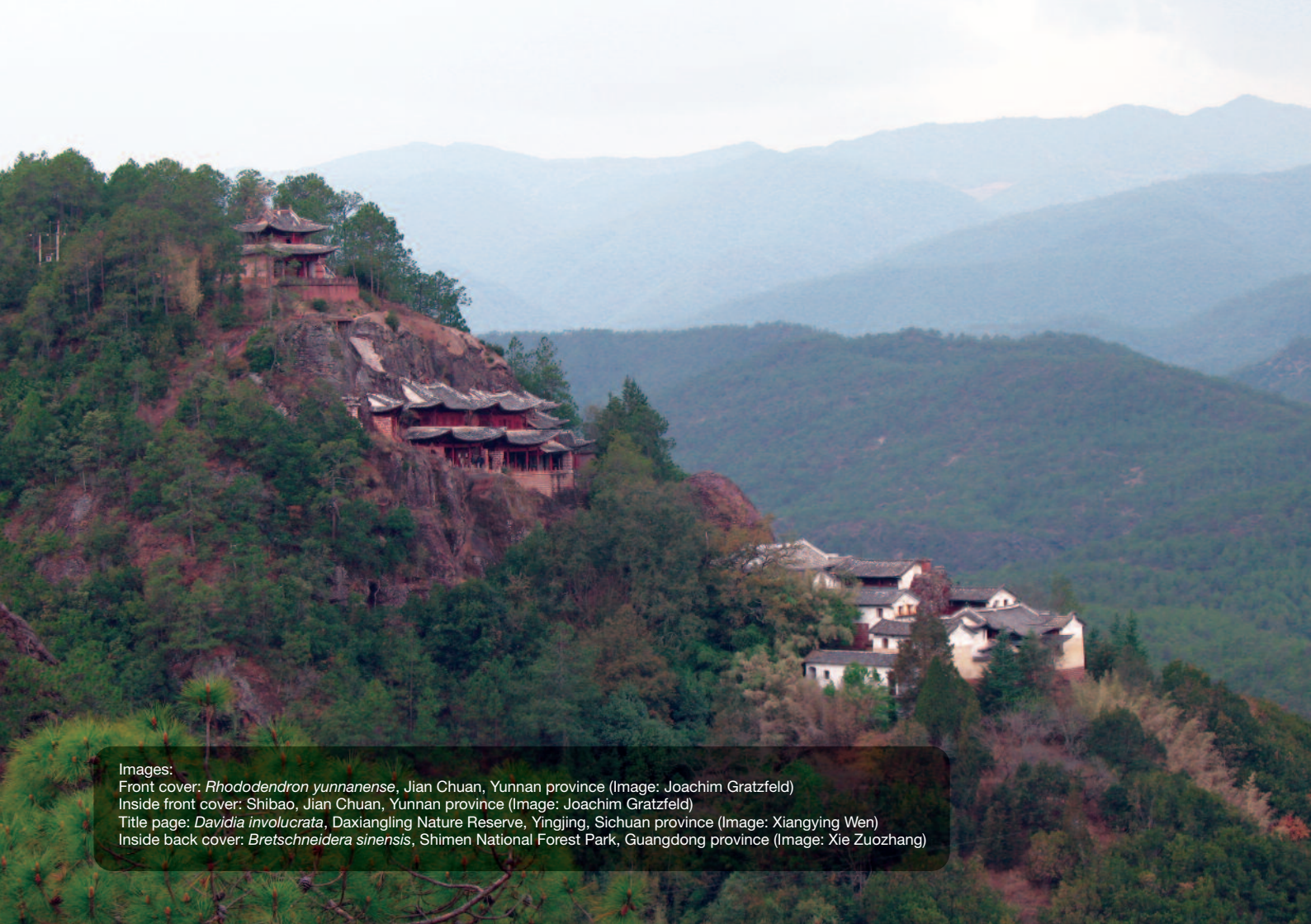
SAFEGUARDING A NATION'S BOTANICAL HERITAGE –

BGCI'S PLANT CONSERVATION PROGRAMME IN CHINA

BGCI

Plants for the Planet



Images:
Front cover: *Rhododendron yunnanense*, Jian Chuan, Yunnan province (Image: Joachim Gratzfeld)
Inside front cover: Shibao, Jian Chuan, Yunnan province (Image: Joachim Gratzfeld)
Title page: *Davidia involucrata*, Daxiangling Nature Reserve, Yingjing, Sichuan province (Image: Xiangying Wen)
Inside back cover: *Bretschneidera sinensis*, Shimen National Forest Park, Guangdong province (Image: Xie Zuozhang)

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Joachim Gratzfeld and Xiangying Wen

June 2010

Botanic Gardens Conservation International

BGCI

Plants for the Planet

Great Wall, Badaling, Beijing (Image: Zhang Qingyuan)

One in every five people on the planet is a resident of China

But China is not only the world's most populous country – it is also a nation of superlatives when it comes to floral diversity: with more than 33,000 native, higher plant species, China is thought to be home to about 10% of our planet's known vascular flora.

This botanical treasure trove is under growing pressure from a complex chain of cause and effect of unprecedented magnitude: demographic, socio-economic and climatic changes, habitat conversion and loss, unsustainable use of native species and introduction of exotic ones, together with environmental contamination are rapidly transforming China's ecosystems. There is a steady rise in the number of plant species that are on the verge of extinction.

Botanic Gardens Conservation International (BGCI) therefore seeks to assist China in its endeavours to maintain and conserve the country's extraordinary botanical heritage and the benefits that this biological diversity provides for human well-being. It is a challenging venture and represents one of BGCI's core practical conservation programmes. This brochure aims to give evidence of this commitment and to document and illustrate BGCI's work in China with concrete examples.

A nation with an astounding plant diversity

A vast geographical extent comprising nearly 10 million square km and a complex topography means that China is home to a wide range of climatic conditions from tropical to subarctic and alpine. As a result the country features most vegetation types, from rainforest, subtropical and temperate forest to steppe, desert and alpine ecosystems across an enormous altitudinal range. This extends from below sea level (Aiding Lake, Xingjiang, –155 m) to over 8,800 m above sea level at the peak of Mount Everest.

With virtually all major biomes of the world to be found in China, the country features the most diverse flora of any of the nations in the northern temperate zone. More than half of the 33,000 native vascular plants are endemic and do not occur naturally anywhere else in the world. This includes a number of majestic and iconic tree species such as the Dawn Redwood (*Metasequoia glyptostroboides*), Maidenhair Tree (*Gingko biloba*), Dove or Handkerchief Tree (*Davidia involucrata*), Chinese Swamp Cypress (*Glyptostrobus pensilis*), Cathay Silver Fir (*Cathaya argyrophylla*), Golden Larch (*Pseudolarix amabilis*), Fujian Cypress (*Fokienia hodginsii*) and the Chinese Rubber Tree (*Eucommia ulmoides*).

Evergreen broad-leaved forest, Ding Hu Shan National Nature Reserve, Guangdong province (Image: Li Jiong)

‘Living fossils’ – remnants of an ancient past

An extraordinary diverse topography with unbroken connections among tropical, subtropical, temperate and boreal forests has provided a migration corridor for plants over the course of geological history. While many species that were once widespread throughout the northern hemisphere became extinct in Europe and North America following glaciation periods and lack of viable migration routes, a number of related species are still extant in China.

These ‘living fossils’ or relicts form a characteristic feature of the unique Chinese biological diversity. What is more, the study of relict species is vital to advancing our understanding of how plants have evolved over millions of years of geological history and contributes to our expanding knowledge of evolutionary concepts on Earth.

◄ *Gingko biloba*, Phoenix Hill, Beijing (Image: Guangyu Liu)

► Fossil of *Gingko* sp., Eocene period (~50 million years), Stonerose, Washington, United States

Fossils of the genus Gingko *have been found in 10–50 million year old strata throughout central and northern Europe and North America. This indicates that the genus had a much wider distribution in the past but occurs today in the wild in China only.*

Native Chinese plants – vital in securing the livelihoods of local communities

For thousands of years, wild plant resources have been used by the Chinese for provision of food, medicines, fuelwood, timber, fibres, gums, tanning materials, aromatic oils and dyes. Several thousand species of Chinese origin are now cultivated throughout the world, notably plants of nutritional, medicinal and ornamental value.

China is home to more than 1,300 native edible plant species. A large number of globally cultivated crop species trace their origin to central, eastern and southern China where the number of relatives of these crops – including rice, wheat and soybean – is correspondingly high. These wild relatives provide a rich genetic diversity, and are of global importance in the development of new varieties to improve yields, quality and resistance to pests.

For millennia, the Chinese have relied on an elaborate medical tradition based on plants. More than 11,150 native plant species are used for medicine today in China. Chinese herbal medicine also enjoys growing popularity in the West, and is of increasing interest to medical researchers and pharmaceutical companies.

Hundreds of species of Chinese origin are cultivated as ornamentals worldwide in private and public gardens. Rhododendrons, magnolias, camellias, gardenias, jasmines and primroses are just a few on the long list of popular Chinese garden plants.

Rheum palmatum, Dulongjiang, Gongshan, Yunnan province (Image: Chen Yousheng)

*Rhubarb (*Rheum officinale; Rheum palmatum*) has been cultivated in China for more than 5,000 years for its digestive and laxative properties. One of the first written historical accounts of the use of rhubarb is from the legendary Chinese emperor Shen Nung said to have lived some 4,700 years ago. Revered for his meticulous study of plants and their potential in curing disease, a catalogue of 365 different herbal medicines is attributed to him.*

Shui Xie, South China Botanical Garden, CAS, Guangzhou, Guangdong province (Image: Ouyang Pei)

Chinese botanic gardens generally are affiliated with different government agencies. Most research and conservation programmes are undertaken by botanic gardens that are under the administration of the Chinese Academy of Sciences (CAS), while gardens managed by other national and local government agencies focus mainly but not exclusively on public education and outreach. Together, the botanic gardens of China form one of the world's largest national alliances for the safeguarding of plant diversity.

Botanic gardens and arboreta in China – custodians of Chinese plant diversity

China's history in garden design and development is virtually as old as its medicinal tradition based on plants. Han emperor Wu Ti who lived more than 2,100 years ago, is said to have planted exotic trees and herbaceous species in his palace gardens brought back by collectors who had been dispatched to distant parts of his empire.

The symbolic representation of the essence of nature, through rocks, pools, and the choice and arrangement of flowers and trees is a central element of Chinese gardens. Gardens evoking a microcosm of the larger natural world, and gardening as an act of reverence, are concepts that have influenced garden development in China right up to today.

Chinese botanic gardens have seen a remarkable evolution in more recent times. Today, there are more than 160 botanic gardens and arboreta, the majority to be found in the temperate and subtropical regions of central, eastern and southern China. They have varied roles including scientific research and conservation, public display of collections, environmental education, recreation and relaxation.

BGCI's conservation work in China

A tremendous floristic diversity and the national recognition of the role of botanic gardens to safeguard this botanical heritage for generations to come, explain BGCI's special attention to managing a multifaceted conservation programme in China. In a country where a large proportion of the population still directly depends on natural resources and more particularly wild plants to meet livelihood needs, such a major programme focus is even more essential to achieve positive conservation outcomes.

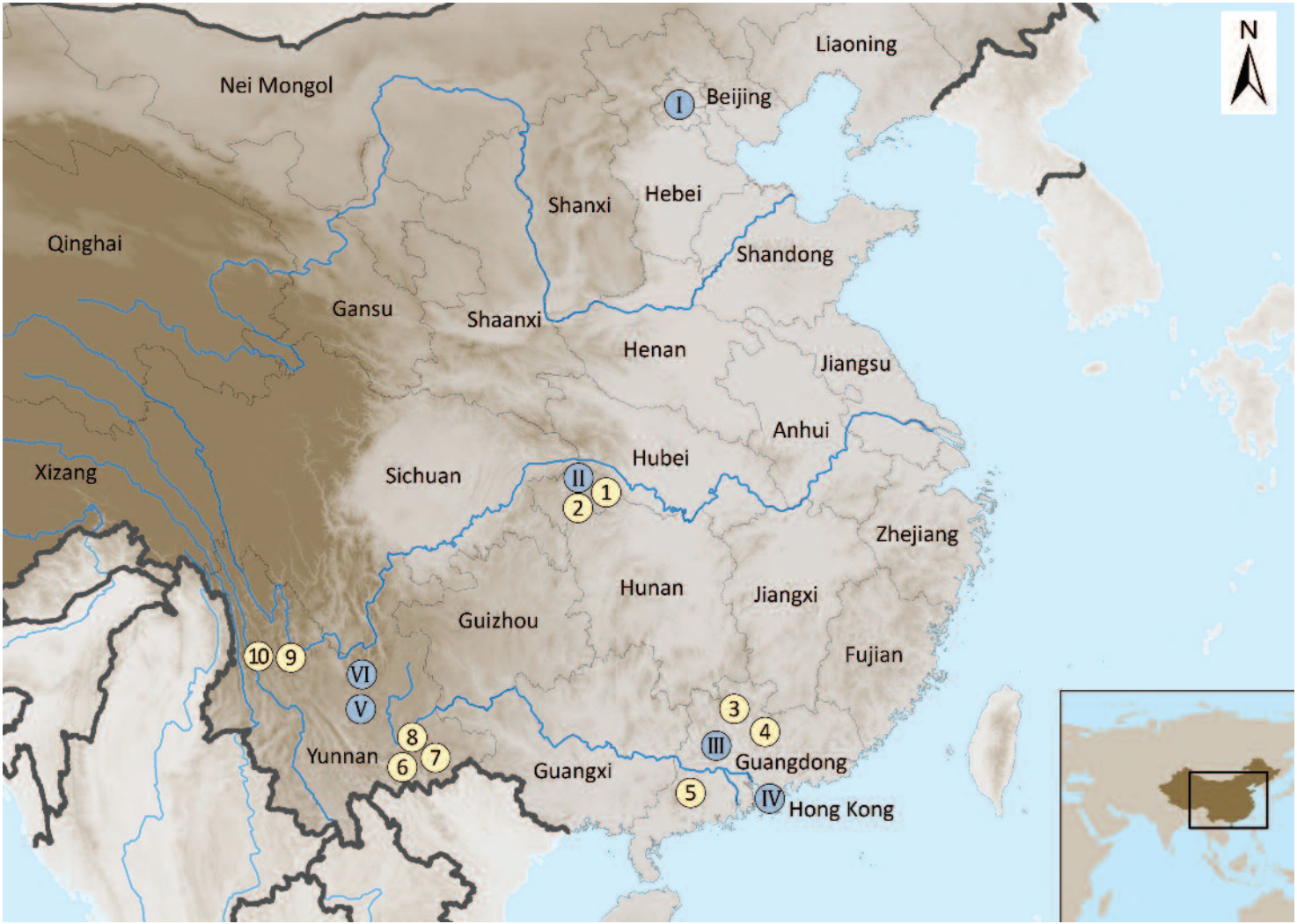
Hosted by the South China Botanical Garden, CAS, Guangzhou, Guangdong province, BGCI's China Programme Office works with botanic garden members and conservation partners towards the objectives of BGCI's Five Year Plan 2007–2012:

- **Securing plant diversity**
  to maintain species and ecosystem functions that provide a vital basis for livelihoods of rural communities.

- **Enabling people and botanic gardens**
  to enhance proficiency and capacity of stakeholders to implement practical conservation initiatives.

- **Influencing decision-making and policy**
  to link practice and policy, as well as replicate and scale up successful conservation interventions.

Prinsepia utilis, Jian Chuan, Yunnan province
(Image: Philippe de Spoelberch)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BGCI's current partners and projects including priority species

I **Institute of Botany, Chinese Academy of Sciences (CAS), Beijing**
(Acer yangbiense; Acer leipoense)

II **Hubei University for Nationalities, Enshi, Hubei**
(Davidia involucrata)

1 Qizimeishan National Nature Reserve, Enshi, Hubei

2 Xingdoushan National Nature Reserve, Enshi, Hubei

III **South China Botanical Garden, CAS, Guangzhou, Guangdong**

3 Nankunshan Nature Reserve, Longmen, Guangdong
(Bretschneidera sinensis; Magnolia longipedunculata)

4 Dongguan, Dongguan Institute of Forestry, Guangdong
(Bretschneidera sinensis)

5 Forestry Bureau Yangchun; Ehuangzhang Nature Reserve, Yangchun, Guangdong
(Euryodendron excelsum)

IV **Kadoorie Farm & Botanic Garden, Hong Kong, SAR**
(Training in plant conservation techniques & botanic garden management)

V **Yunnan Institute of Environmental Science, Kunming, Yunnan**
(Dipteronia dyeriana; Magnolia odoratissima; Magnolia aromatica)

6 Daweishan National Nature Reserve, Pingbian, Yunnan

VI **Kunming Botanical Garden, CAS, Kunming, Yunnan**

7 Malipo Forestry Station,Yunnan
(Magnolia coriacea; Magnolia phanerophlebia)

8 Wenshan Forestry Bureau,Yunnan
(Magnolia coriacea; Magnolia phanerophlebia)

9 Cangshan Mountain Protection and Administration Bureau, Dali, Bai Autonomous Prefecture, Yunnan
(Acer yangbiense)

10 Forestry Bureau, Yunlong; Caojian Forestry Station, Dali, Bai Nationality Autonomous Prefecture, Yunnan
(Woody flora conservation of Zhi-Ben-Shan)

Dipteronia dyeriana, Yunnan Institute of Environmental Science, Yunnan province (Image: Joachim Gratzfeld)

Trees belonging to genera such as magnolia, rhododendron, oak and maple – with a large number of species being endemic to China – are at the heart of BGCI's present conservation endeavours. Ecological and economic values for many of these unique tree species are to a large extent still poorly known. An integrated approach towards their conservation secures these species for the future and for continued scientific research to better understand the ecosystem services they provide.

Securing plant diversity

Safeguarding threatened plants, the ecosystems they form, and the services they provide

In a fast-changing global environment, BGCI has chosen to promote an integrated approach to practical conservation. This includes securing target species in living collections and seed banks of botanic gardens and arboreta (*ex situ* conservation), as well as conserving them in the wild through species reintroduction, population reinforcement and protected area management programmes (*in situ* conservation).

BGCI's conservation projects in China focus on a number of rare and highly endangered tree species, some with equally uncommon names, for instance:

Bretschneidera sinensis – an ancient, relict species from the Tertiary era named after Emil Bretschneider, the famous sinologist and botanist of the 19th century; *Dipteronia dyeriana* – a maple tree relative; *Davidia involucrata* – the legendary handkerchief tree named after its discoverer Père David; or *Euryodendron excelsum* – a species belonging to the same family as the tea plant.

Engaging local communities in conservation

BGCI seeks to promote the active involvement of all relevant stakeholders in its conservation programmes to enable them to voice their needs. Fostering dialogue among local communities as the ultimate natural resource custodians, and authorities from local to national levels (e.g. protected area personnel, forestry department staff) is essential to define locally appropriate conservation and management approaches.

BGCI attaches great importance to supporting its project experts from botanic gardens to facilitate and strengthen this dialogue, capitalizing on both their botanical expertise and public outreach skills. Local level stakeholder workshops form the basis to decide on and sanction conservation action such as species reintroduction and population reinforcement programmes.

In response to increasing challenges posed by rapid demographic, socio-economic and climatic changes, BGCI is exploring new opportunities for interventions that endeavour to meet both conservation and livelihood development objectives. A task shared by every contemporary conservation organization, this entails the conception and testing of novel functional links between species conservation and ecosystem management that will both guarantee ecological services and enhance human well-being.

Consultation with representatives from local communities in Daweishan, Pingbian, Yunnan province (Image: Qian Liangchao)

Efforts to conserve a number of rare and threatened species found in Daweishan Nature Reserve have succeeded in establishing viable stocks of seedlings for population reinforcement programmes in the area. In parallel, BGCI's project partners maintain a dialogue with representatives from surrounding local communities to define the details of the conservation interventions. This has been very effective in gaining local interest and involvement in the restoration activities, and offers the chance for local communities to raise their concerns and explore solutions to the problems of satisfying livelihood needs.

Acer yangbiense, Kunming Botanical Garden, CAS, Yunnan province (Image: Weibang Sun)

Securing *ex situ*

The highly threatened Yangbi Maple is one of the newest maples to be named by scientists and was described in 2003. The tree has a very restricted distribution located in a valley on the western slopes of the Cangshan mountain in northwest Yunnan. Very few individuals remain in the wild. Following successful pollination efforts in 2008, some 3,000 seeds were collected for germination trials at both Beijing Botanical Garden and Kunming Botanical Garden, CAS. So far, germination rates have been very satisfactory at both gardens; a stock of some 1,000 plants has been established. Further research on these seedlings is now being carried out to better understand the species' biology and its genetic variation.

By supporting reinforcement of the natural population of this species with stocks of plants obtained through *ex situ* cultivation, this work will provide a more secure foundation for the future of the Yangbi maple in China.

Conserving *in situ*

In collaboration with Kunming Botanic Garden, this project aims to restore and conserve an area of 11,000 ha of highly diverse temperate forest in Zhi-Ben-Shan, northwest Yunnan. The natural vegetation is under pressure from extraction of fuelwood, medicinal plant harvesting and mining. In the initial phase of the project, surveys have been undertaken to document the woody flora and evaluate the conservation status of selected species. To date, 220 species from 45 families have been identified in the area. Species such as *Euptelea pleiosperma, Tetracentron sinense, Magnolia rostrata* and *Magnolia insignis* are included in the Chinese national red list of highly threatened plants.

Active participation by local communities and authorities in the activities of plant surveying and collection has been encouraged from the outset of the project. The potential to establish Zhi-Ben-Shan as a protected area is currently being explored and elements of a suitable management plan are being drawn up.

Zhi-Ben-Shan, Caojian, Yunnan province
(Image: Joachim Gratzfeld)

Training in grafting for botanic garden and nature reserve staff; Ehuangzhan Nature Reserve, Yangchun, Guangdong province (Image: Xiang Wei)

Since 2003, in collaboration with Kadoorie Farm and Botanic Garden, Hong Kong, BGCI has been supporting a scholarship programme focusing on training mid-level botanic garden staff in theory and practice for native plant conservation. This programme has been designed to help forge closer working relations and promote the sharing of knowledge among botanic garden employees from China and Hong Kong.

► Training in herbarium preparation techniques; Zhi-Ben-Shan, Caojian, Yunnan province (Image: Zhou Yuan)

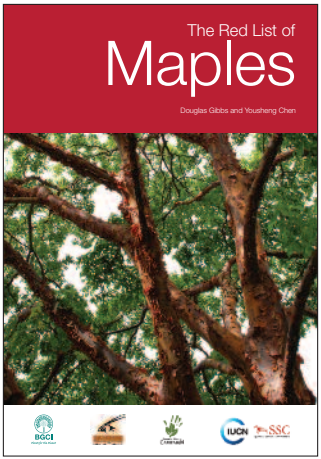
Enabling people and botanic gardens

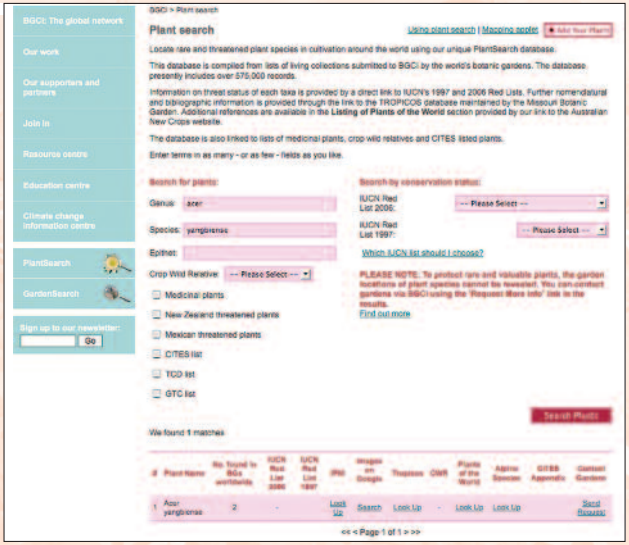
Enhancing techniques and know-how for conservation

Advancement of conservation knowledge and dissemination of related information is at the core of BGCI's mission to engage its members and partners in securing plant diversity. As elsewhere in its programme portfolio, BGCI works in China with botanic garden staff and other conservation practitioners to keep stakeholders abreast of the latest plant conservation knowledge and techniques, as well as environmental education and public outreach approaches. BGCI also connects Chinese experts with botanic gardens worldwide through its global network to facilitate continued capacity building in plant conservation-related disciplines.

Advancing conservation planning tools

As part of our endeavour to provide the latest conservation knowledge and information, BGCI contributes to a number of assessments to evaluate the threat situation of selected species. Following the establishment of such conservation status assessments, BGCI carries out surveys of collections held by botanic gardens and arboreta to document where threatened target species are secured through *ex situ* conservation and to identify potential gaps.





BGCI stores and manages species information held in botanic garden collections through its global databases GardenSearch *and* PlantSearch*, creating a unique tool for conservation planning. It allows users to explore the geographical locations where any recorded species is in cultivation, and through links with other databases of plant-related information, including The IUCN Red List of Threatened Species, to find out how these relate to the natural distribution of a species.*

Latest data reveal that there are almost 25,000 plant species in Chinese botanic gardens and arboreta of which approximately 20,000 are native species. Of the more than 4,400 plants included in the 2004 Chinese national Red List of threatened species, some 1,630 are at present cultivated in ex situ *collections.*

Collage of poster exhibits at the World Botanic Garden Exhibition, 2008 Olympic Games, Beijing

In collaboration with the Botanic Garden Working Committee of the Chinese Academy of Sciences, and the Beijing Municipal Science and Technology Committee, BGCI co-organized the World Botanic Garden Exhibition on the occasion of the 2008 Olympic Games held in Beijing. Seventy individual display panels showed details of the important work being done by botanic gardens around the world. Located at the Olympic Village itself the venue provided an excellent opportunity to highlight the role of botanic gardens in safeguarding the world's botanical heritage.

Strengthening public outreach – campaigning for the conservation of plant diversity

BGCI works with its members and partners to enhance environmental awareness through a variety of public outreach activities. These include the incorporation of conservation messages into signs and printed materials, facilitation of web-based information platforms, or support for the organization of exhibitions, lectures and special events at botanic gardens and other venues of public interest. Strong public environmental awareness is key to a continually evolving conservation rationale, and to gaining political support for its implementation.

Xingdoushan National Nature Reserve, Lichuan, Hubei province (Image: Luo Shijia)

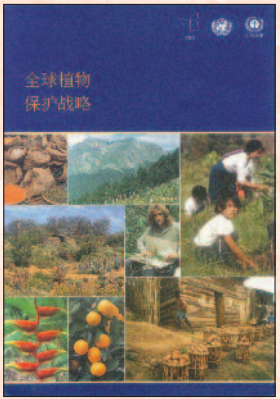
Influencing decision-making and policy

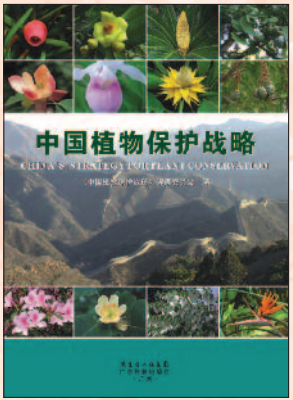
Linking conservation lessons to policy to replicate conservation success

The Global Strategy for Plant Conservation (GSPC) under the Convention on Biological Diversity is the main international strategic framework dedicated specifically to the conservation of the world's botanical heritage. As with many global policies and treaties, a clear understanding of the information and provisions provided by the GSPC is paramount to encourage its implementation at national and local levels.

BGCI significantly contributed to the development of the GSPC. It continues to assist in the promotion and further advancement of this globally important strategy through various means. Building on experiences and lessons learnt from conservation initiatives in China and elsewhere, BGCI seeks to devise reader-friendly user guides and tool kits in a number of national languages, to provide analyses for monitoring the implementation status of GSPC objectives, and to convene national and regional stakeholder consultation workshops to discuss progress and scope for further development and implementation of the Strategy.

The exemplary collaboration of the Chinese Academy of Sciences, State Forestry Administration and State Environmental Protection Administration in support of plant conservation has resulted in a comprehensive framework to safeguard the flora of China for future generations. China's Strategy for Plant Conservation articulates a clear national commitment to the implementation of the Global Strategy for Plant Conservation and highlights the country's central role in contributing to international biodiversity conservation targets.





Dali, Yunnan province (Image: Joachim Gratzfeld)

Looking to the future

Rapid global change presents a major challenge in devising future biodiversity management responses. It calls into question established conservation rationales and demands innovative thinking for sustainable solutions to environmental problems. Coupled with a still fast-growing population which legitimately seeks to participate in the global economic welfare, the pressure on biological resources in China as elsewhere in the world is expected to persist and with this our conservation conundrum.

With modest resources, BGCI continues to address this challenge by working with botanic gardens and other conservation institutions in China and abroad that share a common concern for biodiversity and human well-being. BGCI's actions and strategies for the future are designed to explore new models of facilitating and implementing adaptive changes in practice and policy that will guide informed, cost-effective conservation action and human development. An outline of BGCI's China Programme 2010–2014 is on the following page.

BGCI's China programme 2010–2014

Specifically, BGCI will work to:

- Promote botanic gardens and affiliates in China as vehicles to inform the public about plant diversity and raise awareness about conservation needs and benefits;
- Monitor the status of Chinese plant diversity in the wild and enhance conservation status assessments to inform priority action;
- Survey and document the status of native, threatened Chinese plants cultivated in *ex situ* collections in China and elsewhere in the world in order to identify gaps, strengthen *ex situ* conservation and enhance species and genetic diversity of botanic garden and arboreta collections;
- Scale up *in situ* pilot recovery programmes in China using plant material propagated and scientifically documented by botanic gardens and affiliates to restore species and populations in the wild;
- Explore incentive mechanisms and schemes for community-based conservation in China by using species with economic potential for improved livelihood and conservation outcomes;
- Examine and conceptualize new viable links between species conservation, ecosystem services and the development needs of rural communities to provide for adaptive ecosystem management responses in a climate of rapid global change;
- Foster knowledge exchange and information dissemination among scientists, conservation practitioners and policy and decision-makers to correlate practice and policy in conservation *as the two sides of one and the same coin*.

Caojian, Yunnan province (Image: Philippe de Spoelberch)

Membership is open to botanic gardens, the business community and individuals who value plants and the services they provide. Membership categories include:

Institutional Membership		¥ CNY	$ USD
A	BGCI Patron Institution	52,500	8,000
B	Institution member (budget more than US$ 2,250,000)	7,875	1,200
C	Institution member (budget US$ 1,500,000 - 2,250,000)	5,250	800
D	Institution member (budget US$ 750,000 - 1,500,000)	3,675	550
E	Institution member (budget US$ 100,000 - 750,000)	1,945	300
F	Institution member (budget below US$ 100,000)	895	130

Individual Membership		¥ CNY	$ USD
J	Conservation donor	2,625	400
K/L	Associate member	420	65

An official invoice will be issued outlining the various payment methods when your membership application has been accepted.

For more information about BGCI membership,
or to find other ways to support our work,
please visit **http://www.bgci.org/joinin/member/**
or contact **info@bgci.org**

Your engagement in support of BGCI's mission is warmly welcomed

By becoming a member of the largest global network for plant conservation, you demonstrate your commitment to the cause of safeguarding biodiversity for future generations. As a member, you will be offered numerous benefits and have the opportunity to engage directly in BGCI's activities in China and elsewhere in the world. A wide range of informational resources, available according to your membership category (see opposite) at least twice a year, will keep you abreast of the latest developments in the fields of plant conservation, research and education undertaken by botanic gardens and affiliated institutions. You will also receive invitations to BGCI congresses including discounted registration fees, as well as other special events and seminars convened by BGCI.

Eucommia ulmoides, Beijing Botanical Garden, Beijing
(Image: Li Min)

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BGCI links more than 2,500 botanic gardens in 120 countries, catalysing them to secure the world's botanical diversity for generations to come.

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