CHINA'S STRATEGY FOR PLANT CONSERVATION

Compiled by *China's Strategy for Plant Conservation* Editorial Committee

Guangdong Press Group
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China's Strategy for Plant Conservation–
A Global Leadership for Plant Conservation Programme in
Response to Global Strategy for Plant Conservation

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Sponsors:

State Forestry Administration (SFA)
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Drafters:

The Institute of Wild Plant Conservation, Northeast Forestry University
Botanical Garden Working Committee, CAS
Beijing Botanical Garden, CAS
Wuhan Botanical Garden, CAS
South China Botanical Garden, CAS
Kunming Botanical Garden, CAS
Xishuangbanna Tropical Botanical Garden, CAS

Foreword

Plants are the basic elements on which global ecosystems are built and are thus the core component of biodiversity. A wide variety of plants underpins the beauty of Mother Nature and the diverse mystery of a biological world.

Wild plants are mankind's precious treasure bestowed by nature and important strategic resources for sustainable development of human society. Tens of thousands of plant species have the enormous potential for providing clothing, food, shelter and transportation in support of human kind's sustainable development, which are treasure reserve to whole human beings. As the important carrier of genetic resources and primary producer of natural ecosystem, plants increasingly play an important role in human kind's future.

China is a country with vast territory, complex climate and topography, extremely rich plant diversity, and is home to about 10% of the world's total plant species. China has about 30,000 higher plant species, and is well known for its high species richness, endemic abundance, paleo-floristic origin and rich germplasm resource of cultivated plants, making China a leader in the conservation of global plant diversity. From timbers to rice, from orchids to roses, from tea to bamboos, the rich Chinese plant diversity provides us, human kind, most important resources of foods, medicines, ornamental plants, timbers and many other raw materials for industries.

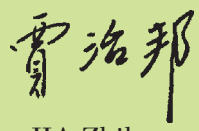
However, wild plants in China are facing shrinking distribution areas, habitat degradation, and sharp reduction of resources, leading to an increase in the number of endangered plant species. Plant diversity in China is severely threatened. Protecting the biodiversity of wild plants is urgent and one of top priorities in China.

China is one of the earliest signatory countries to *Convention of Biological Diversity* (CBD). To implement CBD and strengthen wild plants conservation and

management, China legislated several special regulations for wild plant protection and management including '*Regulations of the People's Republic of China on Wild Plants Protection*' and '*Ordinance of the Nature Reserves of the People's Republic of China*', implemented many national key ecological construction projects including national wildlife conservation and nature reserve construction, national natural forests protection, and botanical gardens innovative construction. The law enforcement, public awareness and education for wild plants conservation and management have been strengthened. By the end of 2006, China had established a integrated *ex situ* and *in situ* conservation system, including 2,395 nature reserves which account for 15% of total Chinese land area, covering 90% of national terrestrial ecosystem types, 65% of higher plant communities had been brought into protection, and 160 botanical gardens were conserving *ex situ* conserving 60% of the endangered Chinese flora.

With a rapid socio-economic development worldwide and the ever-increasing human understanding of natural world, calls for the conservation of wild plants by the international community are getting louder and louder. In 2002, *Global Strategy for Plant Conservation* (GSPC) was adopted unanimously at the 6th Conference of the Parties to the CBD. As a big country with vast plant resources, China has the responsibility and obligation to actively participate in GSPC. Being an administrative authority of Chinese wild plant conservation and management, State Forestry Administration organized a group of experts to formulate '*Chinese Wild Plants Conservation Action Plan*'; based on that, coordinated with Chinese Academy of Sciences and other organizations in response to 16 specific targets of GSPC, we together further accomplished *China's Strategy for Plant Conservation*.

China's Strategy for Plant Conservation is an action plan to provide overall national guidance for Chinese plant diversity conservation and should be an important component of GSPC. I believe the *China's Strategy for Plant Conservation* will certainly upgrade Chinese plant diversity conservation to a new height. The implementation of the strategy will effectively halt the loss of Chinese plant diversity, allowing the Chinese plant diversity conservation programme to be a model of worldwide plant diversity conservation, and greatly contribute to the realization of all targets of the *Global Strategy for Plant Conservation*.



JIA Zhibang

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China's Strategy for Plant Conservation (CSPC) constitutes an important part of the *Global Strategy for Plant Conservation* (GSPC). The accomplishment of the CSPC is based on the State Forestry Administration (SFA)'s on-going planning process for China's wild plant conservation plan and driven by on-going efforts of Chinese Academy of Sciences (CAS) to develop a global vision for plant conservation, stimulated together through the Workshop of Global Leadership for Plant Conservation — China Project (Beijing, China, 7–10 November 2006) organized by Botanic Gardens Conservation International (BGCI) with the support from the UK Government (Defra) through the World Summit on Sustainable Development (WSSD) Implementation Fund. Participants of conservationists and scientists from China, UK and many international conservation organizations (see Annex) agreed that China has already made significant progress towards meeting the targets of the GSPC and that the best way to develop the national GSPC action plan would be to work through a GSPC Focal Point structure comprising three representatives from the Chinese Academy of Sciences (CAS), State Forestry Administration (SFA) and the State Environmental Protection Administration (SEPA). This would reflect the political and technical strengths in Chinese biodiversity conservation with a strong focus on plants. It would also promote harmonization of the work of the three leading organizations with responsibility for the Convention on Biological Diversity (CBD) implementation, national biodiversity conservation and conservation carried out by botanic gardens. Following the workshop, a tripartite Chinese national focal point for the GSPC was nominated comprising Professor HUANG Hongwen (CAS), Mr. JIA Jiansheng (SFA) and Dr. CAI Lei (SEPA) and consequently approved by Secretariat of CBD. Under the leadership of the National Focal Point, a small working group was established to draft the national GSPC action plan, led by Mr. JIA Jiansheng (SFA), Professor HUANG Hongwen (CAS), and Professor ZU Yuangang (Northeast Forestry University, NFU). The working group was coordinated by Dr. YANG Fengjian, and included Professors JING Xinming, SUN Weibang, XU Tianquan and REN Hai. A written consultation process

was carried out, involving a wide range of stakeholders in China. Many responses were gratefully received and a preliminary report was drafted. In January, 2007, SFA organized a consultation meeting, invited a group of experts and the revised report was again circulated among participants of the consultation meeting. A final consultation meeting was jointly organized by SFA and CAS Botanical Garden Working Committee in Beijing, February 5–6, 2007 and the final report was then finalized.

Thanks are due to the NFU working group for their significant efforts in drafting the report and to the members of CAS Botanical Garden Working Committee for revising and editing the report we are most grateful for their contributions.

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Participating Organizations

Department of Wildlife Conservation, State Forestry Administration
18 Hepingli Dongjie
Beijing 100714, CHINA

Chinese Academy of Sciences (CAS) Botanic Gardens Working Committee
Moshan, Donghu, Hongshan District
Wuhan, Hubei 430074, CHINA

Institute of Wild Plant Conservation, Northeast China Forestry University
Box 332, 26 Hexing Rd, Haerbin 150040, CHINA

Department of Nature Conservation
State Environmental Protection Administration (SEPA)
No. 115 Xizhimennei Nanxiaojie
Beijing 100035, CHINA

South China Botanical Garden, Chinese Academy of Sciences,
723 Xingke Road, Tianhe District
Guangzhou 510650, CHINA

Wuhan Botanic Garden, Chinese Academy of Sciences,
Moshan, Donghu, Hongshan District
Wuhan, Hubei 430074, CHINA

Xishuangbanna Tropical Botanical Garden, Chinese Academy of Sciences,
Menglun, Mengla, Yunnan 666303, CHINA

Beijing Botanical Garden, Institute of Botany
The Chinese Academy of Sciences (CAS)
20 Nanxincun, Xiangshan
Beijing 100093, CHINA

Kunming Botanical Garden
Kunming Institute of Botany, Chinese Academy of Sciences,
Heilongtan, Northern Suburbs, Kunming, Yunnan 650204,
CHINA

China Wild Plant Conservation Association
18 Hepingli Dongjie
Beijing 100714, CHINA

Beijing Botanical Gardens
Wofusi Road, Xiangshan,
Beijing 100093, CHINA

Fairylake Botanical Garden
Xianhu Rd 160, Liantang Shenzhen,
Guangdong 518004, CHINA

Division of Nature Conservation and Biodiversity
Nanjing Institute of Environmental Sciences
8 Jiangwangmiao Street
PO Box 4202, Nanjing 210042, CHINA

Kadoorie Farm and Botanic Garden
Lam Kam Road, Tai Po, New Territories
Hong Kong, CHINA

Botanic Gardens Conservation International (BGCI)
Descanso House
199 Kew Road
Richmond, Surrey TW9 3BW
England, UK

BGCI China Programme,
c/o South China Botanical Garden, Chinese Academy of Sciences,
723 Xingke Road, Tianhe District
Guangzhou 510650, CHINA

Royal Botanic Gardens, Kew
TW9 3AB,UK

Royal Botanic Garden Edinburgh
29A Inverleith Row
Edinburgh EH3 5LR,
Scotland, UK

Joint Nature Conservation Committee
Monkstone House, City Road
Peterborough PE1 1JY
England, UK

WWF China
Room 1609, Wen Hua Gong
Beijing Working People's Culture Palace
(Laodong Renmin Wenhuagong Dongmen)
Beijing 100006, CHINA

IUCN China Liaison Office
2–2–131 Tayuan Diplomatic Compound
No. 1, Xindong Road
Beijing 100600, CHINA

IPGRI, China
c/o CAAS,
12 Zhongguancun Nandajie
Beijing 100081, CHINA

Food and Agriculture Organization of the UN, China Office
Jianguomenwai 4–2–151,
Beijing 100600, CHINA

Fauna and Flora International China Programme
PO Box 95, 25 Beisihuanxi Road
Haidian District, Beijing 100080, CHINA

Contents

Message of support 1

Around the world plant species are being lost at an unprecedented rate. This represents a major biodiversity challenge. Plants are essential for ecosystem services and livelihoods and yet their fundamental importance is often overlooked in conservation planning and action. At a time of rapid global change we cannot afford to ignore the threats to plant diversity. The conservation community in China has taken a bold step in developing *China's Strategy for Plant Conservation*. This important document sets out China's commitment to reversing the national loss of plant diversity. As China has ten percent of the entire world flora the actions outlined in this crucial document will be of global significance making China a world leader in plant conservation.

China's Strategy is a magnificent response to the *Global Strategy for Plant Conservation* which has been agreed by all the signatories to the Convention on Biological Diversity (CBD). Implementation of the Strategy in China will make a major contribution to the CBD's overall target, to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth.

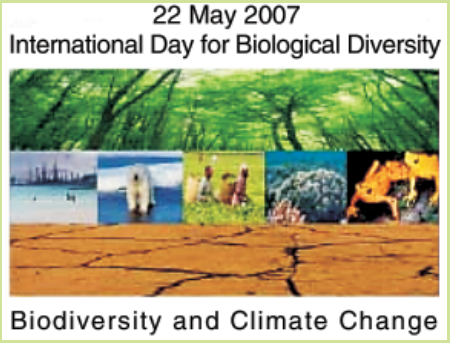
Developing *China's Strategy for Plant Conservation* has brought together a wide range of government agencies within China working together for the first time to save China's rich flora. Botanic Gardens Conservation International (BGCI) is proud to be associated with the development of the Strategy. Supporting Chinas' commitment to plant conservation will be one of BGCI's major tasks over the coming years. In doing so we will draw on the skills and expertise of botanic gardens in our global network and we will communicate the successes of plant conservation in China to our international audiences.

I applaud the Chinese Academy of Sciences (CAS), the State Environmental Protection Administration (SEPA) and the State Forestry Administration (SFA) for their vision in developing *China's Strategy for Plant Conservation* and congratulate all who have been involved in its development. China's plant heritage is a precious resource and we now have a coherent and comprehensive strategy to ensure its survival.

BGCI
Plants for the Planet

Sara Oldfield
Secretary General, BGCI

Message of Support 2



The recent twelfth meeting of the Convention's scientific body reviewed the implementation of the Global Strategy for Plant Conservation and concluded that significant efforts would be needed by all countries to achieve the targets identified in the Strategy. In this context, I am very glad to know that China, as one of the world's megadiverse countries, has developed its national strategy for plant conservation as a national response to the implementation of the Global Strategy. I wish to congratu1ate the Government of China and specifically the State Forestry Administration(SFA), Chinese Academy of Sciences(CAS) and the State Environmental Protection Administration (SEPA), as well as those institutions involved in the development of the Chinese Strategy for Plant Conservation, which could be considered as one of the milestones in China's efforts to conserve and sustainably use its rich biodiversity.

In developing this important Strategy, the Chinese Government has quickly recognized the importance of plant diversity to its efforts to conserve and sustainably use biodiversity and identified key areas of action for plant conservation, China's rich biodiversity contains some 10% of all plant species occurring globally, and almost half of these are endemic to China. A1so, given the vast continental area, diverse habitats, unique geological and evolutionary history, China contains some of the richest and most significant areas of global biodiversity; is rich not only in numbers, but also in the 1evel of endemism; spans integral tropical, sub-tropical, temperate, and cold zones and apart from arctic tundra, contains almost all of the major vegetation types. As such, China's response to the implementation of the Strategy will not only significantly enhance our efforts in meeting the global targets by 2010, but will also contribute to global plant conservation efforts in the context of the Strategy and the CBD 2010 Biodiversity Target: '*to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth*'.

The Global Strategy for Plant Conservation was adopted in 2002 (annex to Decision VI/9) with the ultimate goal to halt the current and continuing loss of plant diversity. It includes 16 out-

come targets to be met by 2010. The Global Strategy providss a useful framework to harmonize and bring together various initiatives and programmes in plant conservation at national, regional and global 1evels. The sixth meeting of the Conference of the Parties to the Convention on Biological Diversity, in adopting the Global Strategy, invited parties and Goverments to develop national and/or regional targets, and, as appropriate, to incorporate them into relevant plans, programmes and initiatives, including national biodiversity strategies and action plans. This strategy demonstrates China's determination and efforts to do just that.

Ahmed Djoghlaf
Executive Secretary

Introduction

Plants are the basic element of global biodiversity. They provide ecosystem services and are essential for the survival of humans and other species. Plants also provide an important core resource for sustainable social and economic development. The different species and various forms and functions of plants provide rich genetic resources, and inestimable ecological, economic, cultural and scientific values. They are irreplaceable for maintaining the global ecological equilibrium and underpin efforts to improve the quality of life for humans. Indeed plants are essential for ensuring sustainable development for human society.

In addition to the relatively few plants that are presently used by humans, significant economic and social value could also be provided by vast numbers of wild plants, the majority of which are yet to be known and utilized. Tens of thousands of plants have enormous potential for supplying resources such as clothing, food, habitation and transportation in support of sustainable development. They are a treasure-trove of natural resources to whole human kind. And yet in spite of our reliance on plants for a multitude of uses, the survival of plants in the wild is increasingly threatened by human activities. Unsustainable harvesting practices, industrialization of agriculture and forestry, urbanization, environmental pollution, land use changing, invasion by alien plants and climate change all mean that wild plants are now facing an unforeseen survival crisis. In recent years, there has been a sharp decrease in natural vegetation, rapid fragmentation of habitats, mass extinction of species and a rapid decline of plant resources.

At the XVI International Botanical Congress in St. Louis, USA, in 1999, more than 5,000 participating botanists and experts concluded, that if timely measures were not taken, half to two-thirds of all plants would be on the verge of extinction during the 21st century. The conference urged the international biological community to pay urgent attention to the conservation of plant diversity and to recognize it as a priority. In April 2000, *Botanic Gardens Conservation International* (BGCI) convened a conference in the Canary Islands. Participants included botanic gardens, international organizations and institutions related to biodiversity conservation from 14 countries. The conference asserted that conservation plans and implementation

guidelines should be formulated under the framework of *the Convention on Biological Diversity* (CBD), and consequently the conference announced *the Gran Canaria Declaration*. Through the efforts of the parties to the CBD, international organizations and non-governmental organizations, BGCI, together with internationally renowned botanists and conservationists, initiated the *Global Strategy for Plant Conservation* (GSPC), which was adopted unanimously at the 6th Conference of the Parties to the CBD at the Hague (Decision VI/9), in April 2002. The ultimate and long-term objective of the GSPC is 'to halt the current and continuing loss of plant diversity'. The GSPC provides a guidance framework for plant diversity conservation at the global, regional, national and local levels in the following five aspects: 'understanding and documenting global plant diversity', 'conserving plant diversity', 'using plant diversity sustainably', 'promoting education and awareness about plant diversity', and 'building capacity for the conservation of plant diversity'. The GSPC also put forward 16 targets for global plant conservation to be achieved by 2010. The Strategy, widely agreed by the international botanical community, was the first example of strategic planning with an explicit timetable and feasible implementation plans adopted under the CBD. After the announcement of the Strategy, states and regions such as Colombia, the European Union, Ireland, Philippines, Seychelles, South Africa and UK responded and launched their own action plans to fulfil the 16 targets for 2010. Fifty or so national-level 'focal points' for implementing the Strategy were also established across Asia, Africa, Europe and the Americas, boosting plant conservation at the global level.

China is a country with the richest and most significant areas of global biodiversity, containing more than 30,000 species of higher plants. China's mosses, Pteridophytes, gymnosperms, and angiosperms respectively make up 9.1%, 22%, 26.7%, and 10% of the global total for each of these groups. China's biodiversity is rich not only in numbers but also in the level of endemism. Some groups have an ancient origin, and there are a large number of cultivated species. Fifty to sixty percent of China's higher plants, or 15,000 to 18,000 species are endemic to China. China is a vast country and is the only one in term of the world flora that spans integral tropical, subtropical, temperate, and cold zones. Apart from arctic tundra, China contains almost all of the major vegetation types. The geological movement of the earth created complex and varied plant habitats in China, making it an important world centre for plant speciation, evolution and conservation. China contains regions that retain the richest relict remnants of early Miocene flora of the northern hemisphere, such as *Cycadaceae*, *Ginkgoaceae*, *Ephedraceae*, and *Gnetaceae* of *Gymnospermae*.

However, China's rapid economic development in the last thirty years and continuous population growth has seriously damaged plant resources and the ecological environment, resulting in over-exploitation of plant resources and a dramatic increase in the number of endangered species. There are nearly 4,000 to 5,000 higher plants that are now threatened or on the verge of extinction, accounting for 15 to 20 percent of China's total. Of the 827 globally endangered species listed by the *Convention on International Trade in Endangered Species of Wild Fauna and Flora* (CITES), 189 are Chinese species, accounting for 25% of the world total.

The Chinese government pays a great attention to plant diversity conservation, and has achieved significant successes in this field. With respect to understanding and documenting plant resources, China has published a total of 80 volumes and 126 books '*Flora Reipublicae Popularis Sinicae* (FRPS)' and 12 volumes of '*Flora of China*' English version. In 1992, China compiled the first volume of the *China Plant Red Data Book* and the first volume of *China Species Red List* in 2004. The Chinese government established the *Catalogue of Wild Plants under Special State Control* (*List One*) in 1999, and will soon announce a second list. China has also established many plant species information databases.

With respect to the conservation of plant diversity, China has set up 2,395 nature reserves, which occupy roughly 15% of China's land mass, and established 1,928 forest parks, and more than 50,000 small reserves of various types, which preliminarily form a more comprehensive network of *in situ* conservation of wild plants. China has also established more than 160 botanic gardens and arboreta which preserve 60% of China's plants at the regional level. Rare plant nurseries, seed banks, and propagation centres play a critical role in ex situ conservation of wild plants. The completion of the *Southwest China Genetic Resource Bank of Wildlife Species* aims to ensure the effective conservation of seeds of critical wild species.

With respect to the sustainable use of plant diversity, the establishment of 12 national long-term crop seed banks, as well as medium-term and local gene banks across the country, and exclusive crop gene banks, will enable China to effectively preserve genetic resources of crops and economically valuable species. In addition, China has established various models for sustainable use of plant resources, vigorously develop organic farming and ecological agriculture. Consequently the certification and accreditation work of organic and 'green' foods, 'non-polluting' agriculture and forest products has been considerably developed. China has also preserved ethno-, indigenous and traditional knowledge of plant use via policy-making and other initiatives.

With respect to the promotion of education and awareness of plant diversity, China has inaugurated dozens of national science popularization education bases for plant conservation. Nature reserves, forest parks and botanic gardens across the country greet visitors with more than 450 million people annually. Taking advantage of annual events such as *Tree Planting Day*, *Earth Day*, *International Biodiversity Day*, *World Environment Day*, *World Wetland Day*, and *National Law and Regulation Publicity Day*, the Chinese government has launched a host of science popularization campaigns and public education activities on biodiversity conservation.

With respect to the building capacity for the conservation of plant diversity, China has promulgated a series of related laws and regulations, including the *Forestry Law*, the *Environmental Protection Law*, *Regulations of Wild Plant Protection*, and *Ordinance of the Nature Reserves* to regulate and safeguard the conservation of plant diversity. A sound law enforcement and monitoring system, from the central to the local level, has thus been implemented.

While achieving significant results, the Chinese government has to clearly acknowledge that several problems in plant diversity conservation remain to be solved. These include the shortage of plant conservation practitioners; conflicts between conservation and use of plant diversity; insufficient conservation facilities and disparity of nature reserves and botanic gardens; incomplete plant diversity-related laws and regulations; insufficient public awareness; and a serious lack of funds for plant diversity conservation.

In order to address existing problems and to coordinate actions, China requires a guiding document at the national level. Such a document would guide action plans for plant diversity conservation across the country. In 2002, the State Forestry Administration (SFA) began to formulate China's action plan for plant diversity conservation. At the same time, the delegates of the Botanic Gardens Working Committee of the Chinese Academy of Sciences (CAS) not only participated in the initiation and development of the *Gran Canaria Declaration* and the *Global Strategy for Plant Conservation*, but also started to articulate a series of scientific research projects. Subsequently the *Mid and Long-Term Programme for Ex Situ Conservation of China's Native Plants*' (Science, 2002) was formulated, and the *Xishuangbanna Declaration- National Conservation Agenda for Chinese Botanic Gardens* (April 2004) was drafted. After more than three years of research, the draft *Action Plan for Conserving Chinese Wild Plants* was initiated in 2005. Taking into account the fact that plant diversity in China is globally significant and that China has obtained significant achievements in the area of global plant diversity conservation, in November 2006, BGCI convened a *Global Leadership for Plant Conservation – China Workshop on Implementation of the CBD Global Strategy for Plant Conservation* in Beijing. The Chinese participants from governmental departments, botanic gardens, institutions, universities and international organizations unanimously reached the conclusion that China, as a country with rich plant resources and as a party to the *Convention on Biological Diversity*, ought to actively respond to, and play a leading role in the implementation of the GSPC (See Appendix Ⅳ). After the conference, coordinated efforts between the Chinese Academy of Sciences (CAS), the SFA, the State Environmental Protection Agency, and other related departments and organizations brought the *China's Strategy for Plant Conservation* into being, as China's response to state actions regarding the GSPC.

Taking the GSPC and the long-term needs of China's planning into full account, the *China's Strategy for Plant Conservation* is modelled on the 16 targets of the GSPC. It brings together 'current status','existing problems' and 'action plans' for each target, in order to elaborate China's strategy and implementation plans. The *China's Strategy for Plant Conservation* will serve as an action outline and play an important role in China's wild plant conservation and management in the future. Through this, China will proportionally contribute to and play a leading role in the realization of the targets of the GSPC.

Target 1 China's native plant species surveying and cataloguing

Current Status

As the third richest country in terms of plant diversity in the world, China has more than 30,000 species of higher plants. There is a high percentage of endemism amongst Chinese flora. In the category of higher plants, 256 genera are recognized as rare and 15,000 to 18,000 species are endemic, making up 50%~60% of the total. Besides this, some groups have an ancient origin and a complicated composition and there are a large number of rare relic species. Some of the relic species are 'living fossils', such as *Metasequoua glyptostroboides* Hu & Cheng, *Ginkko biloba* L., *Cathaya argyophyla* Chun & Kung, *Liriodendron chinese* (Hemsl.) Sarg (see Appendix Ⅰ).

Chinese botanists began to collect and categorize plant specimens early in the 20th century. By 1927, collections from 13 provinces amounted to nearly 160,000 specimens. The collection process made great progress after 1949. By 2000, 17 million specimens were collected. Based on these collections, the Chinese government was able to complete the documentation of China's plant species diversity. Eighty volumes and 126 books '*Flora Reipublicae Popularis Sinicae* (FRPS)' have been published by the end of 2004, in which 301 families, 3,408 genera, and 31,142 species of native, commonly cultivated and naturalised vascular plants are recorded, including 2,588 species of pteridophytes, 237 gymnosperms and 28,317 angiosperms. Twelve volumes of the English-version of the *Flora of China* have been published. At the end of 2006, most of China's provinces and municipalities published a series of their local flora, in which '*Flora of Yunnan*' have all been published, a total of 21 volumes. China has also established information-sharing platforms of species and specimens, including the *Chinese Plants Database* (http://www.plant.csdb.cn/), *Visual Database of Chinese Plants* (http://www.plantpic.csdb.cn/), and the *Chinese Virtual Herbarium* (http://cvh.org.cn/). In three consecutive years since 2004, eight governmental departments including the '*State Environment Protection Agency*' (SEPA) and the '*State Forestry Administration*' (SFA) have been conducting a national biological species resource survey, the results of which clearly reveal the current status of key areas and key species. The survey and documentation process has achieved significant results.

Flora Reipublicae Popularis Sinicae

China and American experts jointly published 'Flora of China' English Version

Collecting specimens in the field

Documenting plant specimens

Digitalizing plant specimens

Existing Problems

Existing problems are as follows: cataloguing plant species with a shorter history study; the bottom line of plant species not clear; the collection of plant specimens and collections inadequate; recently discovered genera and species not included in the existing list; updated information about current plant distribution information needs to be added into the *FRPS*; the inconsistent use of plant names (the same plant having different names in different places and different plants having the same name); low percentage of digitization of local herbarium specimens; imperfect network sharing systems; a significant shortage of taxonomists; and a lack of funding for plant diversity research, specialist training, and the construction of facilities.

Action Plans

Action 1.1 Conducting a large-scale national plant survey: investigating and documenting plant species across the country

Based on the currently available specimens and research data, China will conduct a national survey of plant species and their habitats starting from key areas and groups. Through the survey, China will document known plants as well as recently discovered plants to clarify their names (including their vernacular names), quantity, and geographical distribution. In addition, China will further improve national and local floras, establish dynamic monitoring and management mechanisms for plant resources, set up a regular national reporting system for plant resources and establish a long-term and efficient mechanism to ensure the security of plant diversity, in order to provide a scientific basis for social and economic sustainable development.

Action 1.2 Improving herbaria network and plant specimens digital platforms construction

China will accelerate the construction of the National Herbarium, and enhance the current information exchange and sharing mechanism between herbaria, in order to establish a network system that centres on the National Herbarium. In accordance with universal international technical protocols, China will conduct a statistical analysis and compilation of digitized data of Chinese plant species. In addition, China will add specimen drawings, photographs taken in the field and plant descriptions to construct a modern platform for sharing digitized plant specimens, and make this information available via the internet.

Target 2 A current assessment of conservation status

Current Status

In the 1990s, China completed a preliminary assessment of the threatened status of many plants. Consequently, China compiled the first volume of the *China Plant Red Data Book* (1992) and the first volume of the *China Species Red List* (2004); the former includes more than 380 plants species and 4,408 species in the latter. According to the '*PRC Regulations on Protection of Wild Plants*', China formulated the '*National Protected Plants Checklist*' (the first batch, 1999; recently published the second instalment), a total of 1,900 species. The *Database of Rare and Endangered Plants of China* has been completed and is available online at (http://www.plant.csdb.cn/sdb/dbfl/zhengxi.html). In addition, China has initiated an assessment of the conservation status of some plants, and clarified the basic status and habitat of 189 national key conserved plants. In November 2006, the *Chinese Plant Specialist Group* (CPSG), *Species Survival Commission*, and *World Conservation Union* (IUCN–SSC) convened a conference on endangered and conserved plant resources. At this meeting, issues such as the application of the criteria for red list classification, the survey approach for wild plant species, and the conservation of plant diversity were discussed as a priority. The conference played an important role in further improving scientific evaluation system of the plant protection status.

Sausurea involucrate Kar et Kir.ex Maxim, *known as 'Snow Lily of the Heavenly Mountain (Tianshan)' in China, is a rare plant which grows in snowy mountainous areas at 2,400 to 4,000 metres above sea level without human habitation. As a result of serious over–harvesting, it is on the verge of extinction.*

Existing Problems

As China is a country with extremely rich plant resources, the evaluation of the situation of endangered plants is relatively complex. If the IUCN criteria cannot be completely applied in China, then China, based on the IUCN criteria, needs to improve its own assessment system. As a result of human activities, such as unsustainable harvesting, the threat on new plant species continuously occurring. Therefore the Red List needs to be regularly updated. Furthermore, surveys and assessments in the areas that contain a greater proportion of rare plants and damaged habitats are insufficient. There is also a lack of dynamic monitoring and assessment of conservation efficiency for the survival of conserved plants.

Action Plans

Action 2.1 Establishing scientific criteria for the assessment of plant conservation to evaluate plant survival status

Based on the IUCN criteria and combined with Chinese reality, China will set up and update the criteria for selecting plants to be conserved. China will, as a priority, conduct an assessment of known plants and evaluate the survival status of those included on the Red List, plants with major economic value, and Chinese endemic plant species (genera). Based on this assessment result, China will set up a priority and classification mechanism for plant species conservation, conduct in-depth investigation and evaluation in regions where rare and endangered species are rich and habitats destruction are more serious.

Action 2.2 Assessing the in situ and ex situ conservation status of key plants

Targeting the *in situ* and *ex situ* conservation status of key conserved wild plants, China will conduct a national survey across the country on their population numbers and regularly evaluate the effectiveness of conservation.

Action 2.3 Updating the China Species Red List

According to the results of the monitoring and assessment of the survival status of plant species, China expects to complete the updating of the Red List and its threat classification by 2012.

Target 3 Research and exploration of application models for plant conservation and sustainable use in China

Current Status

China takes conservation and sustainable use of plant resources very seriously. Responding to the realities of conservation targets and zones, China has adopted several suitable models of conservation, including nature reserves, small reserves, community management and in-resident management and conservation. To ensure the appropriate conservation of plants in forest parks and nature reserves, China has established 'maximum visitor carrying capacity' and regular 'recovery' models for sustainable tourism.

In order to focus China's eco-agriculture in an effective direction, the Department of Technology, *Ministry of Agriculture* (MOA), studied 370 models of eco-agriculture techniques and systems from all over the country. After a period of detailed discussion and selection, a short-list of models with their associated supporting techniques have been refined and will be promoted nation-wide. The selected

3R Model of Innovation

Taking advantage of China's endemic plant resources, following the principle of 'consolidating quantity, raising quality, deepening discovery, and utilizing application', the Chinese Academy of Sciences gradually developed a new '3R Model' (Resources, Research and Resolution) for plant research. This model is based on collection, conservation and assessment of plant resources, conducting multi-disciplinary scientific research on plant communities, individuals, cells and gene groups and identification of functional genes. Useful genes in plant species have been selected and new biological products with indigenous intellectual property rights have been developed, including plant genes, breeds, natural medicines, and highly processed plant-based products.

A showcase of this new model is the kiwi fruit (mihoutao) project conducted by Wuhan Botanical Garden. The specialized kiwi orchard is the biggest genebank and nursery of its kind. The Garden on the one hand conducted intensive research on the wild species' genetic diversity, identifying superior and special genetic types; on the other hand, research at the cellular level focused on the origin and migration of the species, multiple evolution, and fruit flesh, and skin colour regulation. The Garden then combined traditional propagation techniques with molecular tehniques to create and explore new breeds. To date the Garden has identified two new varieties 'Hubei kiwi' (hubei mihoutao) and 'flowery kiwi' (fanhua mihoutao) as well cultivating more than ten new types including 'golden' (jintao), 'golden cloud' (jinxia), 'golden morning' (jinzao), and 'golden glamour'(jinyan), 'Wuhan 3'. These new breeds are suitable for fresh consumption and food processing. Other new breeds such as 'landscape charm' (jianshanjiao), 'glistening stars' (mantianxin) and the male breed 'moushan 4' are suitable for ornamental purposes. The 'golden' with golden-coloured flesh is the first example of an indigenous patent of a new breed to be adopted by overseas producers for propagation. This success showcases a sustainable development model with plant genetic research generating a new breed and economic profit, and in return the profit funding genetic resource conservation and R&D.

models were: the 'integrated agriculture, forestry, and husbandry model','ecological grassland rehabilitation and sustainable use model', 'eco-farming model', 'integrated upland, mountain and small river basin management model','eco-agriculture model', and 'eco-agriculture tourism model'.

With the rapid development of China's economy, the demand for forest products has risen dramatically. To meet this demand, the Chinese government initiated a large-scale programme of forestation with fast-growing and rich harvesting, and effectively relieved the pressure on timber production from natural forests (see Appendix Ⅱ).

Furthermore, China has developed 'shade grown' economic models, combining forestry with agriculture, medicinal plants, mushrooms, and pasture. In this way, China has not only been able to stabilize the production systems, but also increased biodiversity in woodlands. Forestry has been transformed from merely forest resource usage to a combination of forest resource production and woodland space utilization. This in turn has resulted in a greater level of efficiency.

Artificial cultivation of medicinal plants has long been practiced in China, and many models beneficial for medicinal plant conservation and sustainable use have been developed. The government established a series of '*Good Agricultural Practice*'(GAP) trial propagation centres within pharmaceutical enterprises and has taken advantage of its administrative resources to set up national propagation and training centres for medicinal plants. The government also established pilot specialized nurseries for medicinal plant seeds and seedlings. As a result, the production of Chinese medicinal plants has moved towards standardization and mass production. China also developed various models of inter-planting medicinal plants in woodlands, including fruit, crops, vegetables and wood. The percentage of land use and the quality of medicinal plants was raised. For example, growing medicinal plants in non-arable land (as a duplication of the wild environment) is designed to solve the problems of medicinal plant quality and the effective content of Chinese medicine.

Existing Problems

Traditional practices and indigenous experiences that are valuable for plant conservation and sustainable use have not been fully identified and exploited. Even though several models have been identified, the level of innovation remains low. Problems requiring special attention are as follows: agricultural land is scattered; agricultural production remains in small-scale; promotional campaigns have been insufficient; and dissemination of information regarding the benefits identified through research is lacking.

Action Plans

Action 3.1 Strengthening the exploration and innovation models for plant conservation and sustainable use

Through extensive investigation and research of existing plants conservation and sustainable use practice, China will systematically collate and analyze, optimize and innovatively upgrade on them and ultimately establish a standardized, scientific and operational model. Based on the results of research, China will actively explore new models for plant conservation and sustainable use, particularly conduct case studies on endemic plants with economic value and introduce effective techniques and protocols for plant conservation and sustainable use.

Action 3.2 Building sustainable models for conservation and use of Chinese threatened plants

Adopting an ecosystem approach based on scientific research, China will continue to conserve natural woodland and wild plants, develop nature reserves, set aside fallow farmland and woodland for regeneration, and plant trees for fast timber production in key areas. China will also promote the introduction and artificial cultivation of wild plants with significant economic value, and carry out basic research to develop the required technologies, select the best propagation models according to their biological and ecological characteristics, particularly conduct research on scientific models of economic utilization of rare and endangered plants (medicine, energy, food, ornamental use and garden landscaping) and effective genetic resource conservation.

Action 3.3 Improving management models for plant conservation and sustainable use

By establishing benefit-sharing models that reflect China's reality and conforming to international norms, China will be able to advance the effectiveness of local plant conservation, and improve the application of management models for sustainable, local social and economic development, ensure the security of national plant resources and ecological systems, clarify the duty and responsibility of related government departments and strengthen scientific research, comprehensive technological cooperation, information exchange, environmental education and public participation, so as to create new models for plant conservation and sustainable management.

Action 3.4 Promoting site-specific models for plant conservation and sustainable use

The relevant departments of the central government will identify and verify superior models nation-wide and establish demonstration zones for different models, which will then be promoted through campaigns launched at a national level. Local governments at different administrative levels will adopt and promote models suitable for their locality.

Target 4 Protection of ecologically important areas in China

Current Status

China is a vast country with six different climatic zones, rich landscape types, and complicated hydrothermal conditions. China is one of the countries with most abundant vegetation types in the world. There are various ecosystems in China, including forest, grassland, desert, inner wetland, sea and coast. In these different ecosystems, China has

Ecological Zones

*The classification of Ecological Zones in China is mainly governed by a three-level criterion of **ecological function**. However, considering that it would be more beneficial for plant conservation if the classification is based on **types of ecosystem** (Nature Reserves are also classified by **type of ecosystem**), this document adopts the latter method.*

Enping Mangrove Nature Reserve

Shennongjia Nature Reserve

Xilinguole Grassland Nature Reserve

Ejina Populus euphratica Forest Nature Reserve

established specialized nature reserves which conserve 11.46% of the ecological zones in varying degrees (see Table 1). In addition to nature reserves, the Natural Forest Conservation Programme, launched in 1998, covers state-owned forests in 17 provinces (regions and municipal cities), 734 counties, and 163 forestry authorities. By 2010, the programme expects to conserve 94.20 million hectares, making up 61% of China's total forest coverage. Since the programme was set up, the government has invested nearly RMB 100 billion, completed the planting of 5.5 million hectares, managed and conserved nearly 90 million hectares under the project '*Year of the Forest*' (see Appendix Ⅲ). In addition, China has established 1,928 forest parks, a total area of 15.13 million hectares, which include 600 National Forest Parks with an area of 11.24 million hectares. China is also one of the countries with the richest types of wetland, 30 of which (total area of 3.43 million hectares) have been listed as internationally important. The Chinese government has established three National Wetland parks and ten National Urban Wetland Parks, thus significantly protecting typical wetlands.

Table 1 Indices of Nature Reserves of different types of ecosystems in China

Types	*Area(10^4 hectares)*	*Total number of Reserves*	*Reserve area (10^4 hectares)*	*Percentage (%)*
Forest	17,500	1,205	3,233	18.48
Grassland, meadow	39,300	46	324	0.82
Desert	26,360	29	3,997	15.16
Inner wetland	3,848	245	2,560	66.52
Sea and coast	30,000	66	98	0.33
Total	117,008	1,591	10,212	8.72

Existing Problems

The conservation of the different types of ecosystems remains inconsistent at a national level. The percentage of conserved grassland and sea and coastal ecosystem remains low. Reserves or other protection measures in some typical ecological zones have not yet been built. Among those ecosystems, the conservation capacity of the existing reserves remains to be improved.

Action Plans

Action 4.1 Scientifically planning and improving the distribution of nature reserves

China will scientifically plan the distribution of nature reserves, improve conservation in each ecological zone, put emphasis on conservation of desert, grassland, and wetland ecosystems (coast and mangrove), and strengthen the reserve network. As for typical ecological zones that have not yet been effectively conserved, national key wildlife conservation zones and natural relic sites, China will set up, as a priority, nature reserves, and complete the infrastructure and building capacity in managing National Nature Reserves. China will, based on wildlife migration patterns, also strengthen the development of the National Nature Reserve Network.

Action 4.2 Transformation of the focus of nature reserves from 'quantity' to 'quality and efficiency'

China will launch a nature reserve survey at the national level to establish an assessment mechanism of the scientific standardization for existing reserves; set up several standardized National Nature Reserves, improve the scientific position of the

ecological function protected areas both in state and local levels. Scientific research will be conducted to raise the quality of conservation science in reserves. An integrated scientific research network will also be launched for nature reserves to clearly identify conservation targets and propose scientific conservation policy. The quality of monitoring and dynamic management will be raised to preliminarily achieve a monitoring system for National Nature Reserves.

Action 4.3 Strengthening law enforcement in priority ecological regions

In the forest ecological zones, China will strengthen law enforcement to aggressively crackdown on logging and over-exploitation of timber, in order to control forest development. In the grassland and meadow ecological zones, China will strengthen the conservation of natural grassland and management of grassland resources, so as to sensibly identify zones for rotational grazing and zones where grazing is banned. Agriculture or other land use practices in such grasslands will be forbidden and the collection of soil-stabilizing wild plants and Chinese medicinal herbs will be strictly controlled. In the desert ecological zones, China will ban collecting of wildlife resources and establish an entry application system for exploration, specimen collection, tourism, and other development activities. In the inner wetland ecological zones, China will strictly limit development and construction activities such as draining of lakes and riverbeds. In the sea and coastal ecological zones, strict limits will be placed on the development of activities such as reclaiming land from the sea.

Action 4.4 Strengthening nature reserve infrastructure and improving the level of management

China will strengthen the infrastructure in nature reserves and its own management capacity, as well as enhancing personnel training and exchanges with foreign countries. The management institutions with the necessary personnel should be established in nature reserves. The quality of inspection and management in National Nature Reserves will be improved and the quality of construction and management will be raised. China will also improve the legal system for construction and management of nature reserves. Each nature reserve, particularly National Nature Reserves, should be governed by operable rules and regulations issued by local governments, so as to comprehensively strengthen the management capability of reserves and related government departments at various administrative levels.

Target 5 Protection of key areas with plant diversity

Current Status

China is a vast country with rich plant diversity and a high level of endemism. Based on international criteria and long-term and repeated research by Chinese scientists, the species richness and number of endemic plants in China covers 17 recognized key biodiversity zones with global conservation significance. These zones include 14 land ecosystems (total area of 230,434,000 hectares). Within these 14 zones, 418 nature reserves have been established conserving 34.19% of the total land territory (see Table 2). According to the *Outlines of National Ecological Environment Conser-*

Table 2 Key areas of Chinese terrestrial ecosystem biodiversity with global significance of protection

	Key zones of biodiversity	*Area (hm^2)*	*Number of nature reserves*	*Size of nature reserves (hm^2)*	*Percentage of area conserved (%)*
1	*South ridge of Hengduan Mt.*	25,474,000	47	6,193,042	24.31
2	*Min Mt.– north ridge of Hengduan Mt.*	11,108,000	29	2,995,767.71	26.97
3	*Junction area of Xinjiang, Qinghai and Tibet*	100,925,000	9	59,506,477.67	58.96
4	*Xishuangbanna in south Yunnan*	1,675,000	3	317,539	18.96
5	*Mountainous area of Hunan, Guizhou, Sichuan, and Hubei borders*	10,204,000	61	1,134,048	11.11
6	*Mountainous areas of Central and South Hainan Island*	1,430,000	21	71,730	5.02
7	*Limestone area of south western Guangxi*	3,777,000	22	534,447.8	14.15
8	*Mountainous area of Zhejiang, Fujian, Jiangxi borders*	4,912,000	18	165,466.9	3.37
9	*Qinling Mts.*	4,801,000	19	366,560	7.64
10	*Ili–West ridge of Tian Mt.*	12,361,000	11	1,423,053.67	11.51
11	*Changbai Mt.*	14,299,000	42	1,065,471.3	7.45
12	*Huitu wetland on the coast (Liao River Estuary, Yellow River Delta, Yancheng beach, east beach of Chongmin Island of Shanghai*	12,333,000	56	2,624,804.7	21.28
13	*Songneng–Sanjiang Plain in the north east*	22,994,000	71	2,310,161.4	10.05
14	*Lake area of the downstream of Yangtze River*	4,141,000	9	85,360	2.06
Total		230,434,000	418	79,793,930,15	34.19

vation (2000), China has inaugurated several new nature reserves where species is abundant, natural biological systems are representative, typical and unspoiled. With respect to plant species of major conservation value and their ecosystem distribution in the west of China, particularly for the critical desert ecosystem and zones of typical desert wild plants, China has established a range of different types of nature reserves (Appendix Ⅱ).

Existing Problems

The building capacity for protection of nature reserves in some biodiversity key zones remains to be improved. Scientific research on plant diversity in the biodiversity key zones also needs to be enhanced. A scientific assessment of the conservation level and effectiveness of plant diversity conservation in these zones requires support. In the execution of national and local construction programmes, damage to local plant diversity still occurs.

Action Plans

Action 5.1 Enhancing function of nature reserves in biodiversity conservation key zones

In the existing nature reserves, supervision and management should be strengthened and, if necessary, the level of management should be upgraded. For example, management could be elevated to the national level and be placed directly under the state's governance. As for key zones where the status of nature reserves has not yet been assessed, remedy measures should be taken as soon as possible.

Action 5.2 Preventing damage in biodiversity key zones caused by national economic construction

In the proceedings of national and local development programmes such as 'Developing the west of China', 'West-east gas pipeline' and 'South-to-north water diversion project', avoiding damage to local plant diversity should be a prerequisite. China will ban development programmes that are likely to create pollution in the biodiversity key zones. As for resource exploration and economic development programmes, China shall implement a pre-assessment system for the likely impact upon plant diversity and habitats and carry out appropriate protection measures.

Action 5.3 Improving scientific conservation systems for plant diversity key zones

For plant diversity key zones, China will establish a scientific conservation system that reflects China's

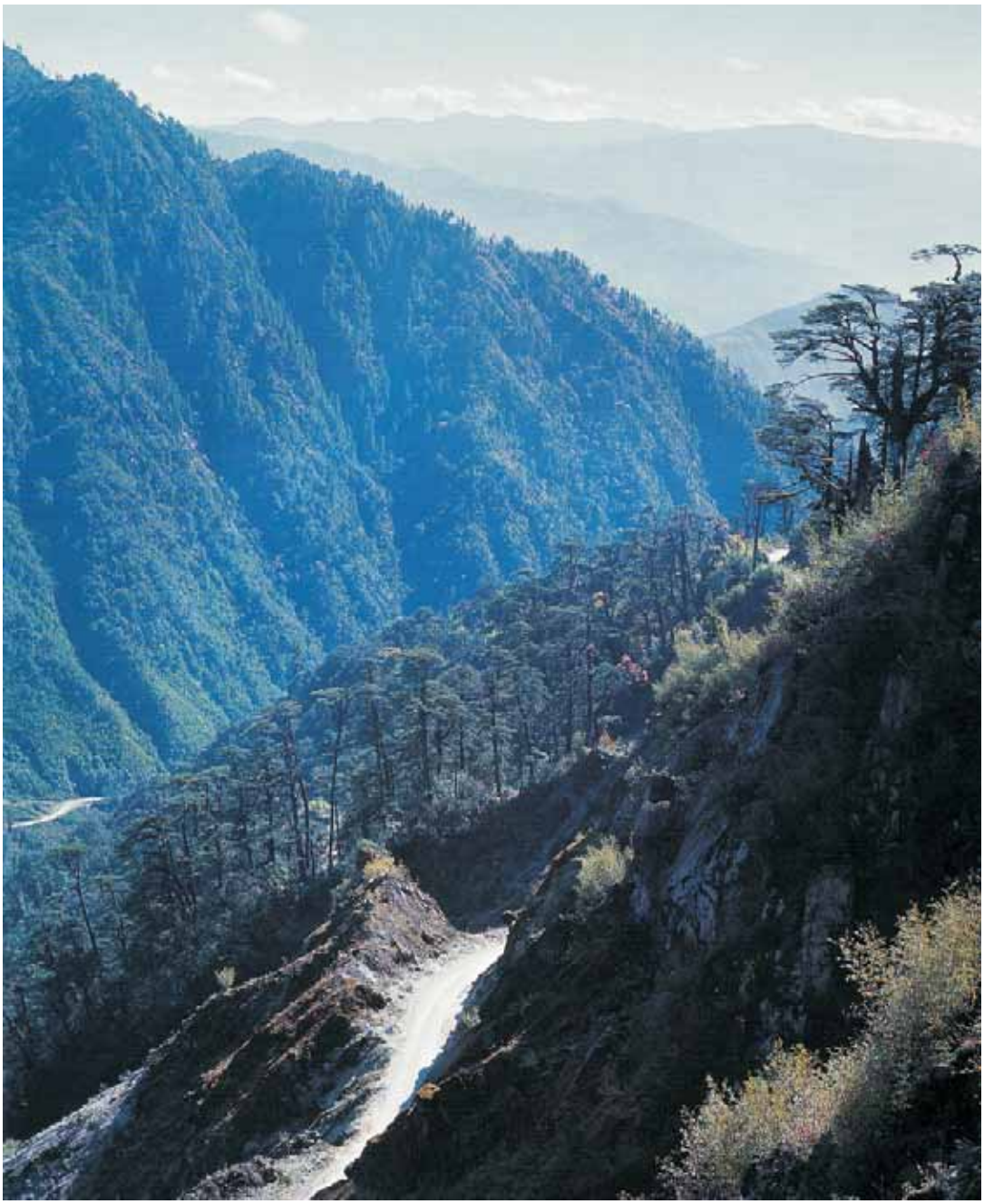
Key plant diversity zones in China

Based on international criteria and long-term and repeated research by Chinese scientists, the species richness and number of endemic plants in China covers 17 recognized key biodiversity zones with global conservation significance. Amongst them there are eleven land zones, three wetland zones, and three sea zones. The 17 zones are as follows: 1) South ridge of Henduan Mt.; 2) Min Mt.-north ridge of Henduan Mt.; 3) Mountainous area of Xingjian, Qinghai, Tibet Plateau borders; 4) Xishuangbanna in south Yunnan; 5) Mountainous area of Hunan, Guizhou, Sichuan and Hebei borders; 6) Mountainous areas of Central and South Hainan Island; 7) Limestone area of south western Guanxi; 8) Mountainous area of Zhejiang, Fujian, Jiangxi borders; 9) Qinling Mts.; 10) Ili, west ridge of Tian Mt.; 11) Changbai Mt.; 12) Huitu wetland on the coast (Liao River Estuary, Yellow River Delta, Yanchen beach, east beach of Chongmin Island, Shanghai); 13) Songnen-Sanjian plain in the Northeast; 14) Lake area of the downstream of Yangtze River; 15) Min River- Esturian Nanao Island estuary; 16) Bou Sea and Channel; 17) Zhoushan-Nanlu Island estuary.

reality and enhance scientific research on conservation biology, conservation ecology, conservation genetics, botanic endemism, flora geography, and other relevant disciplines. To meet the demand of scientific principles and methods of scientific and reasonable protection for plant diversity key zones, China will set up a special research and fund management to gradually establish a sound scientific protection system for important areas of Chinese plant diversity.

Action 5.4 Establishing demonstration bases in biodiversity conservation key zones

China will selectively establish several demonstration bases of various types in biodiversity key zones. These demonstration bases will serve as models for gradual expansion in order to promote biodiversity conservation in key zones across the country. China will also introduce and promote its experience to developing countries.



Hengduan Mt., one of the key areas for biodiversity conservation in China

Target 6 Promoting principles and methods of plant diversity conservation in at least 30% of the farming areas in China

Current Status

China, with a 3,000 years history of farming civilization and sustainable use of agricultural land, has always taken plant biodiversity conservation seriously, which serves as a principle for the management of farming area. China has launched an eco-agriculture movement nation-wide and is raising public awareness about modern production methods of eco-farming. As for the management of weeds, pests, and soil fertility, the Chinese government has encouraged the use of bio-pesticides and organic fertilizers and established a national-provincial trial unit for eco-farming management systems. Eco-farming covers more than 6.67 million hectares, which accounts for roughly 7% of total arable land. Currently 528 trial units in different ecological demonstration zones have been set up, 320 of which are categorized as 'National Ecological Demonstration Zones'. The Chinese government has also announced tentative criteria for establishing national eco-villages. In addition, China has enacted policies to encourage the development of organic agriculture and agricultural stereo planting. These measures largely protected plant diversity in farmlands.

For forests that provide plant-based products, China has created management approaches for sustainable use. These include, for instance, artificial forest directional plantation, exploring woodland strip techniques, and inter-planting of trees and crops. As a result, plant diversity in woodlands has been increased and the proportion of different tree species in woodlands has been improved. By planting trees, shrubs and herbs with various heights, ages and types, China has also created integrated tree communities in order to 'naturalize' artificial forests.

Animal husbandry in China is conducted on a large-scale taking up nearly 400 million hectares of grassland, about 41.7% of the total area. Grassland is not only an important resource for grazing, it also provides basic production materials, supporting the livelihoods of farmers and herdsmen, as well as being a source of plant diversity that must be conserved. Since the 1980s, the 'Household Production Responsibility System' has gradually been adopted throughout China's grazing zones to clarify the need for grassland conservation and effectively motivate a greater number of herdsmen to take on conservation responsibility. By the end of 2005, this new system had covered more than 200 million hectares, which accounts for roughly 70% of the total usable grassland. At the same time, based on fencing grassland, growing grass and pasture, and enclosing cattle, local governments actively guided a transformation of grassland husbandry production models and strongly promoted scientific production methods such as seasonal grazing and developing rotational grazing zones.

Existing Problems

Public awareness of conserving plant diversity of production land is insufficient. The modernization of farming and the over-use of herbicide, pesticide and chemical fertilizer, resulted in a decrease of plant diversity. Insensitive production methods such as over-use of land, over-grazing, and over-harvesting still exist. Consequently a decline and extinction of plant species has resulted. To some extent, lack of scientific knowledge of farmland management and irrigation has also decreased plant diversity in farmland ecosystems. Relevant laws and regulations are still lacking.

Action Plans

Action 6.1 Increasing the proportion of eco-farming in agriculture

China will continue to promote eco-farming, encourage trial models and their associated techniques, reduce the use of chemical fertilizers and pesticides for agricultural production, and expand the number and scale of eco-villages/counties. The target is to establish 10,000 eco-villages with resources recycle in 500 counties/farms. China will encourage the introduction of alternative livelihoods for ecological conservation to farmers in these villages/counties.

Action 6.2 Strengthening grassland development and management

China will improve grassland grazing systems, strengthen support for fencing grassland and further improve the 'Household Production Responsibility System', actively promote grassland conservation, grazing livestock in balance, and operating a system of non-grazed, fallow, and rotational management. China will also set guidelines for the quantity and intensity of grazing and develop artificial pastures to lessen the pressure of increasing grazing on natural grasslands, improve the management of activities that damage biograssland systems and decrease grassland biodiversity, such as continuous grass cutting, over intensive collection of medicinal plants, and land reclamation, to ensure an appropriate number of animals and the intensity of their grazing.

Action 6.3 Lessening the impact of farmland irrigation on plant diversity

China will encourage the use of scientific theory for conserving plant diversity in farmland irrigation methods; give full consideration to the protection and restoration of vegetation; continue to promote vegetation in trenches, on riverbanks and dykes and forestation in farmland strips.

Action 6.4 Encouraging the management principle of production lands conserving plant diversity

China will set up feasible criteria for management principle of production lands conserving plant diversity, so as to improve associated policies and provide a legal system that is beneficial to biodiversity conservation for forestry, agriculture and animal husbandry.

Barley Farmland

Target 7 *In situ* conservation for threatened and endangered species

Current status

In order to assure the in-situ conservation of wild plants and the restoration of natural habitats, China passed the *Provisions of administration of Nature Reserves*, and *Regulations for Wild Plants Protection*, enacted the *National List of Key Conserved Wild Plants*, a total of 1,900 species of plants have been identified as national key protected wild plants.

At the end of 2001, the Chinese government formally launched the *Programme for Developing National Conservation for Wild Plants* and *Nature Reserves*, in which a target of 90% of national key conserved plants should be effectively protected. by 2010, in which species of *Orchidaceae* and *Cycadaceae* has been listed as key conserved species. By the end of 2006, China had established 2,395 nature reserves with various types, a total of 149.95 million hectares, accounting for 15% of China's land area, 265 out of 2,349 are National Nature Reserves, a total of 91.851 million hectares. China also established more than 50,000 small reserves, a total of 1.5 million hectares.

Between 2000 and 2010, the Chinese government will have invested nearly RMB 100 billion on natural woodland conservation; conserve natural woodlands in the upstream area of the Yangtze River, the up- and mid-stream of the Yellow River in the northeast, and in Inner Mongolia. Over this time period, China will monitor the effective conservation and management of the 0.1 billion Hectares of natural woodland located inside conserved areas, in order to restore China's natural woodland resources, as well as create a healthy living space for a great diversity of wild plants within the natural woodland.

Forest parks create healthy conditions for wild plant conservation. By the end of 2005, China had established a total of 1,928 forest parks covering 15.13 million hectares, of which 627 are National Forest Parks with a total of 11.05 million hectares.

Regarding *in situ* conservation for agricultural wild plants, China has established 86 habitat conservation sites specifically for agricultural wild plants.

Through the above-mentioned measures, at present 65% of China's higher plant communities and 70% of national key conserved wild plants have been effectively conserved.

In the National 11th Five-Year Plan for Economic and Social Development, the Chinese government explicitly stated that it will continue improving some nature reserves and support projects for critically endangered wildlife species. In the long-term development programmes, such as the 11th Five-Year Plan of Forests and its Mid- and Long-term Development Plan, the Chinese government also put forward associated conservation targets and action plans for *in situ* conservation of endangered species.

Existing Problems

China's ecological systems as a whole are still very vulnerable and different levels of damage affect different plant habitats. The conservation status

of many species is also still unclear and many endangered plants have not yet been listed in national key conservation programmes. Even though the majority of endangered plants are covered by *in situ* conservation efforts, the effect remains unsatisfactory, due to constraints caused by poor management approaches, insufficient conservation funding and ineffective conservation and management techniques. The assessment system for the effectiveness of *in situ* conservation for endangered plants is also incomplete. The contradiction between wild plant conservation and local economic development is a constraint to the development of conservation areas.

Action Plans

Action 7.1 Strengthening in situ conservation for endangered plant species

China will actively advance the prioritization of classification for endangered plant conservation; enhance the study of conservation theories and approaches for critically endangered plants; initiate case study projects for in situ conservation for some endangered plants as representatives; gradually promote the application of these techniques; enhance habitat conservation for endemic, rare, ancient relic and precious medicinal plants as well as important resource plant species; actively create beneficial living and breeding conditions for these endangered species. About 90% of national key conserved wild plant species will be effectively protected by 2010.

Action 7.2 Improving nature reserve network construction

China will upgrade all types of wild plant nature reserves and small reserves, so as to form a better network of nature reserves; conserve and expand wild plant habitats to fulfil effective conservation for critically endangered plant species and typical ecosystems, and maintain and enrich plant diversity.

Project for wild plant conservation

In June 2001 the SFA launched the ***Programme of National Wildlife Conservation and Nature Reserves****, which implemented, as a priority, projects for restoring wild plants. The targets of these projects are China's endemic species that are critically endangered and for which the number of communities is rapidly declining. The major plant targets are all species of the family* ***Orchidaceae*** *and* ***Cycadaceae****.*

Restoring ***Orchidaceae*** *Project: about 90% of the plants listed in CITES are from the family* ***Orchidacea*** *which is one of the most precious conserved plants. Nearly 100 species of* ***Orchidaceae*** *are on the verge of extinction in China. This project aims to improve and establish new* ***Orchidaceae*** *conservation zones, ban the illegal collection of wild orchids, strictly forbid trade in wild orchids, and launch research on propagation techniques. The project has inaugurated three artificial propagation bases.*

Conserving ***Cycadaceae*** *Project:* ***Cycadaceae*** *is the most ancient gymnosperm family in existence. There are more than 20 species of* ***Cycadaceae*** *in China, ten of which are endemic. This project aims, as a priority, to conserve China's endemic* ***Cycadaceae*** *species, enhance three existing conservation zones, inaugurate one new conservation zone, set up a* ***Cycadaceae*** *parent plant base, and cultivate* ***Cycadaceae*** *species in other suitable areas.*

Action 7.3 Establishing a monitoring and assessment system for *in situ* conservation of endangered plants

Targeting national key conserved wild plants, China will establish the *Chinese Wild Plant Monitoring System* in provinces, municipal cities and autonomous regions across the country; regularly conduct field research to acquire related statistics and visual data, and simultaneously watch the dynamic changes of populations of endangered species; establish, through research, a scientific assessment system for endangered species in order to evaluate conservation effects.

Huang Sang National Nature Reserve

Ding Hu Shan National Nature Reserve

Target 8 *Ex situ* conservation and recovery plans for threatened and endangered species

Current Status

China has established more than 160 large scale botanic gardens and arboreta. Amongst them, the botanic gardens affiliated to the Chinese Academy of Sciences (CAS) and the forestry authorities have better research and plant conservation capacities. In its second innovation programme, CAS has invested RMB 150 million (together with funding from local governments of RMB 300 million) to enhance the three gardens which serve as the core of botanic garden development (South China Botanic Garden, Wuhan Botanic Garden, and Xishuangbanna Botanic Garden). The CAS botanic gardens launched a programme for an ex situ conservation network of national strategic plant species, which provides the genetic resource stock for the sustainable development of the national economy. By 2004, fourteen CAS botanic gardens (and arboreta) had cultivated and conserved nearly 20,000 higher plant species, amounting to 90% of the plant collections of all botanic gardens in China, and had conserved 60 percent of China's regionally important plant species. CAS has also established and improved 90 specialized gardens including *Cycadaceae*, *Magnoliaceae*, *Zingiberaceace*, *Orchidaceae*, medicinal plants, energy plants, desert plants, subalpine plants, horticulture and gardening flowers and plants, and pteridophytes. Many rare plant nurseries, seed banks and propagation centres also play an important role in the ex situ conservation of wild plants.

At present there are 113 species specifically cultivated for ex situ conservation, 31 of which are classified as national first priority conservation targets. Their cultivation amounts to 150,240 hectares and 420 million mature plants. There are a further 82 species categorized as national secondary priority conservation target species and their cultivation covers 119,580 hectares and 2,981 billion mature plants. The cultivation of *Taxus chinensis* amounts to nearly 5,000 hectares. The coverage of conserved *Orchidaceae* and *Cycadaceae* is continuously expanding. In addition, the agriculture authorities have also established 32 germplasm nurseries for crops and their wild relatives, which preserve around 1,300 rare and endangered species.

As an important centre for *ex situ* conservation for biological germplasm resources, the main building of the Southwest China Genetic Resource Bank of Wildlife Species has been completed and passed government inspection. The building includes a seed bank, an in vitro tissue bank, an animal genetic resource bank, micro-organism genetic bank and a DNA bank. Its main purpose is to collect and preserve wild plants, and the secondary purpose is to collect genetic resources of vertebrate animals and micro-organisms. The bank recently collected and preserved, as a priority, rare and endangered species, endemic species, and plants of important economic and scientific value. The goal is to establish an internationally recognized scientific platform for the collection, conservation, and scientific research on wildlife germplasm resources, and the technical supporting systems. Within five years the banks aim to collect and conserve 6,450 species

and 66,500 mature plants, and, within fifteen years, reach 19,000 species and 190,000 mature plants.

Based on the ex situ conservation of endangered plants, experiments on the rehabilitation of a small number of endangered species has been conducted. Projects for the restoration and rehabilitation of species groups include the following: a joint project of the National *Orchidaceae* Genetic Resource Conservation Centre and Shenzhen Institute, Tsinhua University, on *Paphiopedilum armeniacum* S.C. Chen & F.Y. Liu; Wuhan Botanic Garden, CAS, on *Myricaria laciflora* (Franch) P.Y. Zhang & Y. J. Zhang and other endangered endemic plants of the Three Gorges zone; Kunming Botanic Garden, CAS, on *Paphiopedilum malipoense* S. C. Chen & Z. H. Tsai; a joint project of Kadoorie Farm and Botanic Garden, SFA, the Office of Import and Export of Endangered Species, China Society/Association of Wild Plants Conservation, and the *Orchidaceae* Specialist Group, IUCN SSC on *Doritis pulcherrina* Lindl.

Southwest China Germplasm Resource Bank of Wildlife

Specialized gardens in Botanic Gardens of Chinese Academy of Sciences




Ginger and Magnolias gardens in South China Botanic Garden



Aquatic Plants Garden in Wuhan Botanic Garden (conservation/exhibition areas)


Palms and medicine gardens in Xishuangbanna Tropical Botanic Garden






Jujube specialized garden in Turpan desert Botanic Garden

Existing problems

Facilities in botanic gardens, arboreta, and propagation centres need to be further improved, and there are great differences in their capacity building. Coordination and cooperation amongst botanic gardens needs to be reinforced. Key projects of ex situ conservation network conducted by botanic gardens have not covered regions where endemic species are highly enriched. Research on the basic

theory and conservation technology of *ex situ* conservation is not thorough enough, theoretical and technical research on wild plant germplasm *in vitro* conservation (e.g. tissue culture and *in vitro* conservation in seed banks) is still at the initial stage. Associated research on rehabilitation and habitat restoration for rare and endangered plant species is still weak. Rehabilitation projects for rare and endangered plant species conducted by propagation centres that have been scaled-up, have not been formally included in associated plant diversity conservation plans.

Action Plans

Action 8.1 Establishing national botanic garden *ex situ* conservation network system

China will advance the development of Chinese botanic gardens. Botanic gardens will fully realize their potential for *ex situ* conservation of endangered plants. China will, according to the distribution of plants, following site-specific principles, assign national and provincial priority to botanic gardens in different zones as the centres for wild plant *ex situ* conservation. These centres will fully realize their species conservation function. While improving *ex situ* conservation projects in some botanic gardens that show weakness in this regard, China will also plan to inaugurate several new botanic gardens, improve the botanic gardens network and enhance coordination and co-operation for *ex situ* conservation, improve the exchange of resources, information and techniques among botanic gardens and strengthen their technical capacity.

Action 8.2 Mobilizing all levels of social forces to participate in rare and endangered plants and important groups *ex situ* conservation

China will fully motivate individuals and enterprises for *ex situ* conservation of rare and endangered plants and the sustainable development of plants of important potential, strengthen the cultivation and propagation of rare and precious economic plants, artificially cultivate medicinal plants, and conduct an assessment of plants that are beneficial for ecological environment restoration, encourage society to scientifically and sensibly use various types of plants in ecological landscaping projects, and increase the diversity of plants used for ecological environment programmes.

Action 8.3 Enhancing scientific research on ex situ conservation and raising conservation efficiency and quality

China will improve basic theories and scientific research on conservation techniques for ex situ conservation, improve research on *in vitro* conservation techniques (e.g. adult plants, seed, nutritious organs, tissues, DNA, etc.), and systematically study, explore and utilize *ex situ* conservation approaches that have been well practiced in order to generally raise China's *ex situ* conservation capability and efficiency.

Action 8.4 Officially including plant rehabilitation projects into plant diversity conservation plans

China will propose and implement scientifically effective plant species rehabilitation projects, initiate research and experimentation in an integrated manner on endangered plant species rehabilitation, enhance case studies of typicality and systemic research on community restoration, so as to re-introduce 10% or so of endangered plants in China to wild habitats, and improve the dynamic monitoring, management and assessment of re-introduced communities.

Target 9 Strengthening the integrated conservation of the genetic diversity of major socio-economically valuable crops; maintaining knowledge and practice of crop genetic diversity of their traditional use

Current Status

China has rich crop genetic resources and there are many plants of major socio- economic value. The Chinese government takes conservation of plant genetic resources very seriously. In 2003, the State Council approved the establishment of a joint task force of the *Inter-Ministry Joint Committee on Biological Resources*, which assembles 17 Ministries (Commissions) that are led by the *State Environmental Protection Administration* (SEPA). The Joint Committee aims to enhance coordination of conservation and management for biological resources. In early 2005, SEPA led a specialist team from 8 related departments to compile and formulate a National Plan for Conservation and Use of Biological Resources 2006-2030, which focuses on plant conservation. The team also proposed Provisions of Biological Genetic Resource Management. Through years of effort, China has established national, local and some specialized genetic resource banks, which form a better system of crop genetic resource conservation.

Regarding the development of a national germplasm resources bank, China has established one long-term preservation bank and as well as a reserve bank. The former preserves 340,000 accessions of crop genetic resources, the largest number conserved in the world, of which 60% are local species, and about 10% are precious, rare and wild plant relatives. The *Chinese Crops Genetic Resources Information System* (CGRIS, http://icgr.caas.net.cn/) has collected more than 180 crop species and germplasm resource information of 380,000 wild plant relatives. It is one of the largest genetic resource information systems in the world.

Regarding the development of local germplasm bank, besides the *Chinese Academy of Agriculture Science* has established 15 mid-term germplasm banks within their local branches, Guangdong, Hebei, Inner Mongolia, Jiangxi, and Hubei have also established local germplasm banks with varying sizes. The Guangdong germplasm resource bank is the largest crop germplasm resource bank in China, which specifically preserves genetic resources of crops such as rice, wild rice, sweet potato, lychee, banana, and mulberry. It includes six national nurseries and local branches. Hebei established long-term, mid-term and short-term germplasm resource banks, as well as the '*Hebei Crop Germplasm Resource Information System*' (HB CGRIS). The Xinjiang germplasm resource bank has collected and preserved more than 50 crops species and 20,000 accessions. The germplasm resource centres in Inner Mongolia and Jiangxi preserve germplasm 21,000 accessions, conserve and maintain specimens 211,000 accessions. The development of China's specialized crop germplasm resource bank has achieved preliminary results.

Regarding tree germplasm resources, the Forest Plant Germplasm Resource Bank, which was inaugurated in 2002, has collected and pre-

served 3,000 species of tree, shrub, bamboo, rattan, flower and grass and 300,000 to 400,000 accessions. There are 280,500 hectares of land providing good quality species, 158,100 hectares for collecting species and 480,710 hectares of nurseries. The first stage of establishing a National Medicinal Plant Genetic Resource Bank has been launched. Long-term, mid-term, and short-term genetic resource conservation platforms will be set up, and their designed conservation capacity is 100,000 accessions. Yichang City of Hubei province, established the Three Gorges Endangered Plant Species Resource Bank, which is used for preserving rare and endangered plant genetic resources in the Three Gorges area. Jiangxi established the Jiujiang Rare and Endangered Plant Genetic Resource Bank. Xishuangbanna Botanic Garden, one of the core botanic gardens of CAS, established the Tropical Plant Germplasm Resource Bank. Wuhan Botanic Garden established the Central China Endemic and Economic Plant Germplasm Resource Bank, which treats seed, DNA, and plant resources in a holistic manner. South China Botanic Garden established the South China Endemic Economic Crop Germplasm Resoruce Bank. Yunnan established the *Paris polyphylla* Smith (*Araliaceae*) Germplasm Resource Bank, which has collected and preserved 23 out of 24 known wild *Araliacea*

Conservation of China's wild rice genetic resources

There are rich wild rice resources in China. By 2000, three volumes of the 'National Catalogue of Wild Rice Resources' had been compiled and published, listing 6,766 wild rice taxa, 5,909 of which are common wild rices, 713 medicinal wild rices and 144 Oryza granulata Nees & Arn. ex Hook. f. wild rice.

Numerous wild rice varieties provide a rich genetic resource base for China to improve modern cultivated rice varieties. Statistics show that modern cultivated rice, as opposed to wild rice, has lost nearly 30 percent of alleles and 50 percent of genetic diversity, including many superior genes. Yuan Longping, 'Father of Hybrid Rice', found on Hainan Island an adult wild rice plant amongst a wild rice community which he used for breeding between wild rice and cultivated rice, producing a high yield hybrid rice variety. The hybrid variety was introduced nationally and resulted in 20% increased yield. Yuan historically contributed to solving China's food problem. In 2006, hybrid rice was being grown over 0.42 billion Hectares, and more than 600 billion kilograms of yield has been increased.

Herbal medicines marketing

in the world, and also discovered and named three new species. It is the world's most complete *Araliaceae* germplasm resource bank. Similarly, Hubei has established the largest *Pyrus pyrifolia* Nakai germplasm resource bank in the world.

Existing Problems

The basic research on conservation techniques of germplasm resources needs to be strengthened. The genetic resources collection, cataloguing and preservation of some local varieties is insufficient; and the damage to wild populations of many important crops still occur from time to time.

Action Plans

Action 9.1 Establishing a germplasm resource bank for the relatives of plants with important socio-economic value

China will collect and document genetic resources of important socio-economically valuable plants and their relatives (including cultivated and wild species, particularly local species), establish germplasm resource bank for relatives of important economic plants.

Action 9.2 Strengthening the conservation of wild plant populations with important socio-economic value

Via local plant conservation stations, China will raise awareness of the importance of wild plant genetic resources in supporting social and economic development. It will also raise public awareness of the need to conserve plants with important socio-economic value. Regarding rare, precious, endemic and genetically superior plants that are endangered and wild relatives of important crops, China will establish nature reserves (sites), in order to carry out long-term habitat conservation. Within the nature reserves (site), all human activities that are not related to conservation will be prohibited. China will place adjacent areas under strict control, so as to maintain natural evolution patterns. China will also formulate models of land use and management in the reserve sites.

Action 9.3 Assuring the conservation of 70% of the genetic diversity of China's major economic plants and enhancing genetic resource conservation and research on monitoring techniques

Based on the results of the national plant genetic resource survey, China will make an assessment of the genetic diversity conservation status of important economic plants, as well as formulate associated conservation measures, in order to ensure that 70% of the genetic diversity of China's major economic plants will be conserved. China will strengthen the monitoring of the genetic diversity of the most economic plants, in order to understand their genetic diversity changes, implement necessary conservation measures in a timely manner. China will dynamically monitor plants under different conservation models, in order to assess genetic 'completeness' and make complementary collections if necessary. China will conduct research on the best conservation approaches and the safest conservation environment for various genetic resources.

Action 9.4 Utilizing State macro-control to reduce the loss of genetic resources of important economic plants

The Chinese government will utilize central government's administrative functions to collect and conserve plant species that are currently regarded as of low economic value but with potentially important genetic resources, particularly some superior local species, conduct macro-control to realize comprehensive and sustainable conservation for genetic resources of various plants.

Target 10 Strengthening the management of alien invasive plants; ensuring the security of native plant communities, ecological environments and ecosystems

Current Status

China is such a vast country with various natural habitats that it can provide suitable habitats for almost any species. Due to the rapid development of China's foreign trade, the threat from invasion by alien species is becoming more serious. At present more than 400 alien invasive organisms are recognized, of which more than 100 pose a great danger. More than 50 out of the 100 most threatening alien species listed by IUCN are found in China. According to the incomplete statistics, annual economic losses by related sectors of the national economy caused by alien invasive species amounts to RMB 119.8 billion.

The Chinese government takes management of alien invasive organisms very seriously. In order to strictly control entry of alien invasive organisms, the government declared and issued laws, regulations, and creeds including, among others, the *Seed Law*, the *Law on Entry and Exit Animal and Plant Quarantine*, *Provisions of Plant Quarantine*, *Rules of Qualification, Certification, Supervision and Administration of Introduced Wood, Seed, Seedlings and Other Breeding Materials*, and the *List of Entry and Exit Plant Quarantine of Potentially Dangerous Epidemics, Pests and Weeds* (law is Tentative). In 2003, SEPA, together with CAS, issued China's first list of alien invasive organisms. In 2004, in order to strengthen the prevention and management of alien invasive organisms, a National Coordination and Cooperation Working Group on Prevention of Alien Organisms, led by the Ministry of Agriculture (MOA), was established and involved SEPA, General Administration of Quality Supervision, Inspection, and Quarantine (AQSIQ), SFA, *Ministry of Science and Technology*, General Administration of Customs and State Oceanic Administration. An Office of Alien Species Management was also set up. The MOA established the Research Centre for Prevention and Control of Alien Invasive Organisms, providing organizational and technical assurance for the prevention of alien invasive organisms. Considering that alien organisms are posing a serious threat to China's forest resource conservation and eco-security, the SFA established the Management Office within the SFA for Prevention of Alien Forest Detrimental Organisms.

In recent years, China has adopted integrated control measures involving physical, chemical, biological, and agricultural approaches. The MOA launched an anti-alien invasive organism movement *Ten Provinces, Hundred Counties* for three consecutive years, which effectively controlled the spread of major alien invasive species such as *Eu-*

Seven agriculture and forestry systems

These seven systems are Propagation of superior species; Innovation and application of agricultural technology; Animal and plant conservation; Quality and safety of agricultural products; Information of agricultural product market; Agricultural resource and ecological conservation; and Social service of agriculture and management systems.


Alien invasive species Mikania micrantha H.B.& K..

patorium adenophorm and *Eichhomia crasipes* (Mart.) Solms. Risk analyses of alien species were conducted by AQSIQ, SFA, MOA, and SEPA, and resulted in a more comprehensive risk assessment system. The MOA has formulated an *Initiative of Emergency Response to Major Agricultural Detrimental Organisms* and *Alien Organism Invasion Contingency*. The Ministry has collected information and statistics on alien invasive organisms covering more than 300 species and set up China's Alien Species Database. It also compiled China's Major Agricultural and Forest Alien Invasive Species List. The Ministry activated the '*Animal and Plant Conservation System*', one of the seven major reaction systems, to invest in advanced-warning and control of major agriculturally detrimental organisms. The government also launched a series of research projects, such as a survey on alien invasive plants, current situation analysis, major damage assessment, and effective control measure identification. The Botanical Institutes and Botanic Gardens of CAS also conducted a series of research projects on effective control mechanisms and control approaches for alien species. In addition, international conferences such as the 'Prevention and Management of Alien Organism Invasion in China' and the 'APEC International Conference on Prevention of Alien Invasive Organisms' have been convened in China, actively pushing forward China's research on alien invasive organisms.

Existing Problems

Laws and regulations are incomplete. Special regulation of the prevention, introduction, and control of alien organisms has not been introduced. Public awareness of the damage caused by alien invasive organisms is insufficient. Systematic education, training and campaigning has not yet been initiated. Techniques of risk assessment, quarantine, inspection, testing, monitoring, advanced-warning, control and decontamination are lacking and current approaches need to be improved. Research on distribution, community dynamics, and spread mechanisms are inadequate.

Action Plans

Action 10.1 Establishing and improving related laws and regulations and emphasizing risk assessment of alien organisms

China will formulate the *Provisions of Alien Organism Prevention* and the *National Plan for the Prevention of Alien Invasive Organisms* and strengthen the management of intentional and unintentional introduced alien organisms, improve associated laws and regulations on alien organism entry quarantine, reinforce means, methods, and effectiveness of quarantine, control the introduction of detrimental alien organisms, set up an con-

trol mechanism for alien invasive species, establish an overall control system covering each stage of the emergence of damage caused by alien invasive organisms, improve its risk assessment approach and risk management procedures of threats caused by alien invasive organisms on ecosystems, habitats, and species, and set up a national monitoring and advanced-warning system of major alien invasive organisms.

Action 10.2 Enhancing scientific research on alien invasive organisms

China will enhance basic and applied research on prevention of alien invasive organisms. From the molecular basis of the rapid detection of invasive organisms, mechanisms of organism invasion and damage, risk assessment, early warning and control techniques, China will reveal major problems and their core techniques during the process of alien organism invasion at elements, individuals, populations, communities, and ecosystems level, so as to gradually build up a scientific research system on organism invasion. In typical ecological regions, China will set up trial centres to launch explorative studies on the invasion process, damage mechanisms and prevention techniques for alien invasive organisms and promote the research results.

Action 10.3 Enhancing inter-departmental information exchange and actively initiating international cooperation

China will enhance inter-departmental information exchange on emergence, development and outbreak of alien invasive organisms, and coordinate actions of related departments. Closely combining related international projects (e.g. Global Invasive Species Project, CITES, and CBD), China will initiate international cooperation on the management, prevention and control of alien invasive organisms.

Action 10.4 Enhancing technical training and public education of alien invasive organisms

China will establish an alien invasive organism training centre (network) to provide technical training for involved personnel on management approaches for correctly identifying invasive organisms and their damage, prevention, decontamination and control, and restoration of ecosystems. Via various media, China will launch a science popularization campaign on damage, prevention and control of invasive organisms, in order to raise awareness of the need for prevention with the general public.

Target 11 No species of wild flora endangered by international trade

Current Status

In order to reinforce control of endangered plants and their international trade, the Chinese government declared the *Law on Administrative Permission*, the *Forestry Law*, *Regulations of Wild Plants Protection*, and *Regulations of Administration of Import and Export of Endangered Wildlife* to regulate import and export of endangered wild plants. *Outlines of National Ecological Environment Conservation* also endorsed a severe crackdown on the illegal trade of endangered plants. Since China became a signatory party to CITES, it established the Office of Management of Import and Export of Endangered Species to implement the convention on behalf of the Chinese government, with twenty-two local branches across the country. The government also set up inspection stations, equipped with specialized personnel, at major ports such as Shenzhen and Dalian. The Office of Management of Import and Export of Endangered Species together with the Customs Authorities issued the *Catalogue of Goods Import and Export of Wildlife* so that the full scope of activities involving the import and export of wild plants are subject to monitoring. Administrative permission such as the *Issuance of License of Permission to Import and Export Wild Plants* and the *Issuance of Certificates of Non- Import and Export of Wild Species Enlisted in the Commodity List* is carried out, and quotas and labelling management for some sensitive species are implemented. To reinforce international and local cooperation on controlling the wild plant trade, a Conference on 'Controlling Wildlife Trade in Asian Countries and Regions' was convened in Beijing in 1995, in which the *Beijing Declaration on Controlling Wildlife Trade in the Asian Region* was passed. Since 1997, an annual coordination meeting amongst mainland China, Hong Kong and Macau has been organized. In 2006, the 'Conference on Endangered Wildlife Trade in Hong Kong and Guangdong' was convened in Hong Kong, co-

Gongbei Customs caught endangered plant 'Aquilaria'

hosted by *Guangdong Forestry Department*, the *Guangzhou Branch of the Office of Management of Import and Export of Endangered Species*, and *Hong Kong SAR Agency of Agriculture, Fishing and Nature Protection*. Between 2003 and 2006, a 'Bilateral Meeting of Controlling Wildlife Trade and Implementing CITES' has been twice convened, co-organized by the *Chinese Office of Management of Import and Export of Endangered Species and the Vietnamese CITES* authorities. In addition, SFA and provincial forestry departments and public security authorities have also played a significant role in the crackdown on wild plant harvesting and illegal trade.

Existing Problems

The volume of trade involving China's wild plants and plant products is unclear. An assessment of the impact of the export trade on wild plant groups and communities is lacking. Coordination involving several government authorities such as agriculture, forestry and environmental protection is difficult. Furthermore, resources for law enforcement are limited and scattered among various departments. Therefore, effective management of the international trade of wild plants and plant products is difficult to achieve. International trade of wild plants has yet to be independently covered by national biodiversity action plans.

Action Plans

Action 11.1 Conducting trade assessment on recorded international trading of wild plants

Based on annual records of licensed import and export of wild plant species and their quantity (certified by the Office of Management of Import and Export of Endangered Species and Customs), and records of illegally traded species, China will launch a trade survey of imports and exports of wild plant species and quantity. China will also conduct an assessment of the economic potential of natural wild plants in international trade. The result of such a survey will be compared to the import and export of wild plant species and quantity so as to assess the impact of international trade on wild plant resources.

Action 11.2 Reinforcing law enforcement and preventing wild plant smuggling

China will actively initiate a concerted effort by law enforcement amongst authorities, including public security, customs, and administrative management of industries to form a coordinated effort to crackdown on the illegal international trade in wild plants, apply modern technologies to enhance identification and authentication of wild plant and plant products so that a fast and precise scientific basis can be provided to law enforcement for plant conservation, improve its contacts, coordination, and cooperation with other Convention Parties, Interpol and the World Customs Organization, in order to timely obtain and provide international trade development and smuggling information.

Action 11.3 Coordinating inter-department cooperation

China will coordinate inter-departmental cooperation among wild plant export related authorities, enhance information sharing and clarify duty and responsibility of related departments to improve management efficiency of the international wild plant trade.

Target 12 Strengthening sustainable use and management of plant-based products

Current Status

Plant-based products in China mainly include foods, feed, medicinal herbs and health foods, timber and fibre products. There are roughly 1,300 food plants in China, with the staples being rice, wheat, and maize. In 2005, the production of these three staple foods amounted to 80% of total food production. There are 3,000 plant species used for feed, most of which are species of *Gramineae*, *Leguminosae*, *Cyperaceae*, *Compositae*, *Chenopodiaceae* and are generally cultivated. China has established the China Feed Plant Visual Database and published China's Feed Plants, which provides information about their cultivation.

China has a major tradition of using medicinal plants which include 11,164 species. The long history of Chinese medicine civilization has developed a unique cultivation system for medicinal plants. Out of around 600 medicinal plants, more than 200 species have been cultivated (400,000 hectares and annual production 300,000 tons), comprising around 30% of commonly used medicinal plant

Southern Taxus chinensis cultivation centre

species. Annual cultivated production amounts to 40% – 50% of the total purchased amount. There are 2,000 species of timber plants and among 1, 200 fibre plants, 300 species are commonly used.

From 2001 to 2005, the MOA sequentially launched the *Action Plan for Non-Polluting Foods*, and *Green Actions on Agricultural Product Quality and Safety*, implementing a *Three in One, Progressing in Wholeness* development strategy combining organic foods, 'green' foods, and non-polluting foods. Regarding organic foods, in June 2004, eleven departments including the Ministry of Commerce, AQSIQ, and SEPA jointly issued *Several Opinions on the Advancing Development of the Organic Foods Industry*. Through close coordination, the MOA and SEPA proposed and formulated *National Criteria on Organic Foods* and *Measures on the Administration of the Certification for Organic Foods and Implementing Rules on Organic Foods Certification and Labelling*. Thus a basic supervision and inspection system was brought into being. By the end of 2005, 520 organic food enterprises, 2,278 kinds of goods and 310,900 hectares had been certified by the Green Chinese Organic Foods Certification Centre. Regarding 'green' foods, China has established a 'green foods' criteria system, which covers criteria for environmental quality of area of production, production techniques, and product. By the end of 2006, 4,615 enterprises nation-wide, with 12,868 products, have efficiently used the 'green' food label. The Chinese Green Foods Development Centre officially verified 151 centres in 14 provinces and 119 counties (270,000 hectares) as standardized production centres for green foods. Regarding non-polluting foods, AQSIQ formulated the *National Criteria on Agriculture Product Quality and Safety*, setting up specific requirements for the environment of area of production and quality of non-polluting foods. The MOA also sequentially set up 358 non-polluting foods criteria. By the end of 2006, 23,636 agricultural products nation-wide had been certified as non-polluting, 17,996 of which are plantation products. 30,255 areas of agricultural production have been certified as non-polluting, 21,701 of which are of plantation origin, covering 23.27 million hectares.

Forest certification is one of the important measures for safeguarding forest resource sustainable development. In 2003, the *Decisions on Advancing Development of Forestry by the State Council* explicitly recommended to 'actively step-up forest certification and qualification, conforming with international norms as soon as possible'. At present, the *Criteria of Forest Certification* has been completely drafted, while the *Criteria of Certification of Production, Marketing, Inspection and Management Chain* and the *Measure of Administration of Forest Certification* are being proposed. Meanwhile, the government will seek certification and cooperation of international systems such as Forest Stewardship Council (FSC) and PEFC. So far, more than 430,000 hectares of forest in China have been certified by FSC and 137 forestry enterprises have been certified for their production, marketing, inspection and management chains. In order to explore techniques of sustainable forest management in various zones, and provide forestry with experiences and models for early transformation to sustainable development, and in accordance with the *Programme of Experimental Demonstration Plots of Sustainable Management of State Forest in China* issued by SFA in 2004, China has established demonstration plots in the following counties:

Wangqing (Jilin), Qingyuan (Liaoning), Yongan (Fujian), Linan (Zhejiang), Jinggangshan (City) and Qingan (Jiangxi), and Xiaolongshan (Gansu).

In order to realize sustainable use of wild plant resources, the Chinese government has greatly supported the cultivation of wild plants with high economic value. The SFA convened the 'National

Seminar on the Sustainable Use of Wildlife' in Sanya, Hainan Island, putting forward the idea that in order to develop a sustainable approach, China will actively encourage cultivation of wild plant resources and strategically shift to using mainly cultivated resources. After the seminar *Guiding Opinions on Promoting Sustainable Development of Wildlife* was drafted. Eighty-three out of 123 wild plant species, for which the international trade status is recorded, are planted using high cultivation techniques. China has conducted comprehensive genetic experiments on all of these species, as well as launching research on selecting superior varieties, propagating seeds, planting seedlings, managing larger-scale plantation fields, harvesting, storing and transporting.

Existing Problems

There are numerous and complicated plant-based products in China. So far a product catalogue is missing and there is no documentation of the sources of the plant material. Generally the skills for artificial cultivation remain low. Techniques of sustainable use in the plantation sector remain rather undeveloped. A portion of wild plants that are of higher market demand have not yet been incorporated into systems of mass production and intensive propagation and cultivation. A quantity standard on wild plant harvesting is lacking. Techniques and measures regulated by eco-farming criteria are yet to be applied to cultivation processes.

Associated policies that encourage the development of organic foods are insufficient. Productivity of organic foods is low and fails to meet domestic and external market demand. Quality of inspection and administrative institutions for certifying non-polluting agricultural products remains unsatisfactory. Regarding forest certification, due to the non-existence of certifying institutions, the high cost of certification and insufficient public awareness, forest certification is yet to fully develop. Wild plant resources reduction still exists because of the over harvesting.

Action Plans

Action 12.1 Conducting a thorough survey on sources of China's plant-based products

China will launch a survey on sources of plant-based products to build a catalogue of wild plant goods, investigate the current situation of plants that are listed in the catalogue about their wild and cultivated status and make an assessment on their sustainable use.

Action 12.2 Enlarging the scale of production of organic foods, green foods, and non-polluting agricultural products

China will continue to improve organic food certification-related laws, regulations and criteria systems, and actively push forward policies that encourage the certification of organic foods, green foods, and non-polluting agricultural products; improve the inspection and administration of certification of organic foods, green foods, and non-polluting agricultural products, and actively raise public awareness of eco-farming.

Action 12.3 Strengthening forest certification in China

China will further step-up forest certification to improve sustainable forest management. Regarding national key conserved wild plants, China will establish an effective market entry permission mechanism, by adopting universal labelling and certifying for wildlife and its products; Implement a licensed timber system which will effectively protect wild plant resources that are of greater market demand; improve macro-control and allocation of wildlife resources, and halt abuse and over-consumption of wild plant resources.

Action 12.4 Actively encouraging artificial cultivation of wild plants

China will encourage plant resource users to step up artificial cultivation to attract related sectors of the society to get involved in cultivation of wild plants, so as to lessen the pressure of harvesting on wild plant resources; improve wild plant research particularly on artificial cultivation of medicinal plants, to overcome critical technical problems occurring in artificial cultivation and continuously increase the scale and quality of artificial cultivation; and promote domestic and international 'Good Agricultural Practice' criteria to enlarge wild plant artificial cultivation.

Action 12.5 Controlling the intensity of extraction of wild plant resources

China will actively monitor changes in the total quantity of wild plant resources over time. A strictly controlled intensity of harvesting will be applied to those species where greater reserve quantities are necessary – where artificial cultivation is limited or non-existent; adhered to the principle of 'harvesting amount less than natural resource regrowth'. China will assure sources of wild plant resources will not be threatened by their trade. In regard to harvesting and trade, an administrative permission system will be strictly applied to national key conserved plants.

Target 13 Halting the decline of plant resources that support livelihoods and associated traditional knowledge; encouraging the inheritance and innovation of traditional Chinese knowledge and practice

Current Status

China is a large agricultural country and farming is the major economic resource for China's villages and village society. In the long historical evolution, traditional knowledge and practices of using plants and their products for supporting livelihoods have developed across the country. Examples include tea in Zhejiang, Fujian, and Anhui, apples in the Shandong Peninsula, and grapes in Xinjiang. In addition, many plants play an important role in local food security. For instance, hull-less barley is a Tibetan staple food. Its planting area makes up 60% of the total planted area of Tibet. Chestnut, sweet potato and potato still play an important role in food security of less-developed regions. The Chinese government takes food security as the first priority in agriculture and national economy. It is currently proposing the *Law on the Assurance of National Food Security* in order to safeguard social stability and national security. Taking staple food as the core, the Chinese government is also concerned about locally value-added plant products to raise the economic income of farmers all over the country. In July 2005 the AQSIQ issued the *Ordinance on the Protection of Geographical Labelling* to effectively safeguard the protection of local speciality products.

China is a multi-ethnic country with fifty-six ethnic groups. Each group has formed its own rich plant knowledge and culture over generations practice and production. Ethno-botany focuses on the research of knowledge and practical experience of plant traditional utilization through the use of modern scientific research approaches, to realize the sustainable use of plant resources, and conservation of biodiversity and cultural diversity. Ethno-botany is instrumental in the modern development of the national economy and the improvement of livelihoods for each ethnic group. In 1987, Kunming Botanic Garden, CAS, established an 'Ethno-botany Office' and in the same year the first training course on ethno-botany was organized in the

The richness of China's ethnic medicine

China is a multi-ethnic country. Each ethnic group has formed its own rich plant knowledge and culture over generations of practice and production. Ethnic medicine is an important component of Chinese traditional medicine. Nearly one third of the fifty-five ethnic minority groups in China have their independent medical systems. The most important ethnic medicines include Tibetan medicine, Mongolian medicine, Bai, Tai, Yi, Miao and Uighur medicines. These ethnic medicines play an important role in the ethnic groups' medicine and health care systems. Wild plants are the major source of ethnic medicines. According to statistics, there are 12,600 kinds of traditional ethnic medicine, over 90 percent of which are plant based.

Xishuangbanna Tropical Botanic Garden. In 1996, applied research of ethno-botany was included in national research plans. In 2002, the first 'Conference on Ethno-Botany and Industry Development' was convened in Zhejiang, which served as a good platform for the exchange of information on ethnic plant genetic resource protection and sustainable use.

An important component of ethno-botany is ethno-medical research. The Chinese government takes the investigation, exploration and protection of ethnic plant medicine very seriously. 'Project of Collection, organization and Preservation of Chinese Herbal Medicine and Ethno-medicine Specimen' totally collected, organized, and authenticated 4,189 dried specimens of Chinese herbal medicine and ethno-medicine species and 1,050 medicine species. China established a dried specimen and medicine database and published the *Illustrations and Pictures of Chinese Medicine and Ethno-medicine*. Through years of effort, the Ministry of Public Health, with a team of 16 provincial medicine inspection institutions from areas where the use of ethno-medicine is a high, jointly compiled several volumes of the China Ethno-Medicine Encyclopaedia. In addition, the Chinese government also organized related departments to publish many books on ethno-medicine such as *Medicine of Tibet*, *Medicine of Mongolia*, and *Common Uighur Medicine*. In relation to developing ethno-medicine, the Chinese government also assisted

Tibetan Barley

Xinjiang Turpan Grape

Hangzhou Tea

Yunnan Panax notoginseng

ethnic minority groups to develop many new medicines. There have been more than 120 kinds of Mongolian medicine developed. In addition, two specialized ethno-medical universities have been independently established to support ethno-medical training. Twenty-five subjects for the first series of the curriculum on Tibetan medicine have been published and curricula for Mongolian, Uighur, and Tai medicine are currently being compiled and edited.

In addition to ethnic medicine, many other plant-related good traditional practices have also been developed and preserved by ethnic groups. Many excellent traditional practices of minority can contribute to local plant resource conservation and sustainable use. For example, many plants necessary for Tai daily life are directly harvested and cut from the forests. Local protocols such as '*cut mature bamboo and save young shoot*' and '*save root while cutting trunk*', and '*protect branch while harvesting fruit*' are applied, assuring their sustainability. Ethnic religious beliefs also play an important role in plant diversity conservation. Many scenic spots and 'sacred mountains' of Taoism and Buddhism are areas where wild plant resources are better conserved. Because of the establishment of community and village regulations, good traditional knowledge is preserved and promoted, which promotes the plant diversity conservation. For example, in Xishuangbanna there are 400 'sacred mountains' that are strictly protected by Tai communities. China has attempted to adopt domestic legalization and application of traditional knowledge to genetic resources. China has not only taken advantage of the current intellectual property rights (IPR) system, but has also passed related laws and regulations to administratively protect them, such as issuing patent rights, trademarks, and plant species rights.

Existing Problems

The extent of planting and processing of China's indigenous speciality plants is low and uncompetitive. The majority of plant-based ethnic traditional knowledge and practice is scattered in society, and has not yet been systematically compiled. As ethnic communities open up, alter their life styles, and advance towards modern production models, a great deal of superior ethnic traditional knowledge is gradually vanishing. The current IPR system can not provide comprehensive and systematic protection for traditional knowledge. A fair access and benefit sharing mechanism is lacking.

Action Plans

Action 13.1 Accelerating the development of indigenous superior plant products

Via policy mechanisms, China will encourage standardized planting and processing systems for indigenous superior plant products in order to improve their productivity and competitiveness.

Action 13.2 Systematically organizing ethnic traditional knowledge

China will conduct a general survey on ethnic traditional knowledge, in which local ethnic traditional knowledge survey groups will be set up. Local people in possession of indigenous knowledge will be contracted by community leaders in an effort to record this knowledge. Categorized by ethnicity, collected traditional knowledge will be sorted and compiled. National or related provincial authorities will fund the publication of a certain portion of this information.

Action 13.3 Protecting ethnic traditional knowledge

In the area where transportation is convenient and

ethnic tradition is typical, China will establish ethnic attraction, recreation and tourism zones, in order to fully demonstrate superior ethnic traditional culture to the outside world, promote ethnic culture. In ethnic regions that are unsuitable for tourism, China will set up museums of ethnic traditional culture to collect and preserve this culture.

Action 13.4 Creating benefits fairly sharing mechanism of traditional knowledge

China will include traditional techniques, knowledge and practices in the scope of IPR protection. Meanwhile, regarding the uniqueness of traditional knowledge, China will systematically propose and implement legislation with explicit policy goals according to current IPR laws and form an overall integrated legal protection system, whereby traditional knowledge can be effectively protected and benefits can be fairly shared.

Target 14 Strengthening publicity programmes and public education on plant diversity conservation

Current Status

The Chinese government takes public education very seriously, seeing students' environmental education as an important component of a quality education related knowledge of plant diversity conservation has been incorporated into primary and secondary school curricula. Each year the Chinese government, taking advantage of 'Tree Planting Day','Earth Day','World Biodiversity Day', 'World Environment Day','World Wetland Day' and 'National Laws and Regulations Publicity Day', organizes a series of diversified and attractive campaigning and educational activities for biodiversity conservation. For example, it will launch a campaign week and host news conferences, international conferences, and painting exhibitions. China makes full use of the media including TV, newspapers and radio, focusing on hotspot issues related to biodiversity conservation in China to publicize laws, regulations, and scientific knowledge related to biodiversity. These activities play an important role in popularizing scientific knowledge about plant diversity amongst the general public and raising public awareness and involvement with plant diversity conservation. For instance, during the period of the 10th Five-Year Plan, 2.75 billion people took part in planting 12.04 billion trees, and more than 60,000 obligatory tree-planting centres with various types were newly constructed.

In 2003, the SFA and The China Green Times jointly hosted a writing competition 'Your View on Wild Plant Conservation', which received the community's fervent attention and positive response. More than one thousand essays were submitted. The event greatly raised public awareness of wild plant conservation. Forest parks, botanic gardens and nature reserves also play a significant role in plant diversity conservation campaigns and education. In 2005 forest parks received more than 180 million visitors. CAS Botanic Gardens and other botanic gardens annually receive nearly 60 million visitors, while visitors to nature reserves exceed 200 million.

Lu Yongxiang, President of CAS, cutting the ribbon at the inauguration ceremony in Kunming Botanic Garden, CAS

Public Education Center of South China Botanical Garden, CAS

Lecture on popular science in South China Botanical Garden, CAS

Science and Technology Week opening of South China Botanical Garden, CAS

At present, besides 14 out of 1,282 'popular science education centres' are certified by the Chinese Association of Wild Plant Protection as National Science Popularization Education Centres for Wild Plant Protection. Tianjin Tropical Plants Tourism Garden and Chishui Suo Luo (*Alsophila spinulosa*) Museum are 'popular science education centres' focused on plants. Each year these centres host lectures on popular science exhibitions and contests, which strongly advocate plant diversity protection in China. A great number of official and unofficial websites have also been set up to disseminate the importance of plant diversity and the urgent need to protect it.

Existing Problems

More efforts are required to popularise basic knowledge about biodiversity. Communication patterns are to be improved. An action plan for plant conservation publicity and education projects has not been specifically formulated. Local campaign institutions are undeveloped and poorly equipped. Public awareness on wild plant protection and resource protection is low. The number of social groups engaging in biodiversity conservation is small and the groups remain weak.

Action Plans

Action 14.1 Raising the intensity of governmental campaigns for plant protection

An action plan for plant protection campaigning and educational projects is to be formulated to serve as guidance for plant conservation campaigns. Government at each administrative level is to be equipped with a wild plant conservation campaign branch, and local nature conservation institutions are to establish specialized campaign teams. A 'Wild Plant Conservation Day (Week)' and its associated activities are also to be established. China will increase investment and improve campaign facilities and approaches, improve environmental campaigns and educational websites as well as visual and audio databases, and modernize education and training approaches.

Action 14.2 Strengthening plant conservation education

China will continue setting up 'green schools', 'green kindergarten', and 'green universities' in state universities, including ensuring that envi-

ronmental courses or lectures are incorporated into non-environmental fields, and universities will gradually list environmental courses as their curricula. China will develop various ways of introducing in-service training to improve management level of personnel at all levels and promote the peaceful development of plant diversity conservation.

Action 14.3 Integrating various sectors of society and raising public awareness of plant conservation

Botanic gardens will remain the dominant force for plant conservation education and campaigning. China will continue to open up botanic gardens to the outside world to raise the general consciousness of plant protection during the process of recreation and tourism. Non-governmental groups and related professional associations will play a full role in plant protection campaigning and education to generally popularize scientific knowledge of wildlife conservation.

Popular Science Education Beginning With Kindergarten Kids

Target 15 Strengthening capacity for plant diversity conservation

Current Status

The SFA, SEPA and Misinstry of Agriculture have respectively established several organizations responsible for wild plant protection, including the *Department of Wildlife Conservation*, the *Department of Natural Ecology Protection* (SEPA counterpart Office of Biodiversity Conservation) and the *Department of Education of Science and Technology*. Regarding the legal system, the *Environmental Protection Law*, the *Regulations of Wild Plant Protection*, and the *Provisions of Nature Reserves* provide a legal supporting and action norms. To set specific guidance for China's wild plant protection actions, SFA began to organize compiling and propose the *Action Plan for Conserving Chinese Wild Plants* in 2002. At the same time the Botanic Gardens Working Committee, CAS, began to initiate planning, while they took part in developing the *Gran Canaria Declaration* and GSPC, and sequentially formulated the *Mid- and Long-Term Plan of Chinese Native Plant Ex Situ Conservation* (Science, 2002) and drafted the *Xishuangbanna Declaration – National Conservation Agenda of Chinese Botanic Gardens* (February 2004).

Many Chinese higher education institutions and research institutions provide specialized plant diversity-related courses. Institutions and botanic gardens affiliated with CAS established a variety of conservation centres and propagation centres, having trained a substantial number of research and management specialists for wild plant conservation. Many provincial forestry and agriculture colleges provide the necessary professional training for local personnel. In addition, Chinese universities, scientific institutions, governmental agencies, and international organizations also host training courses and study groups at various levels to promote Chinese plant diversity protection. For example, in 2003 the Biodiversity Conservation Association, Tsinghua University, and BP jointly

Fieldwork of Northeast Forestry University and South China Normal University

organized the 'Chinese University Students–NGO Biodiversity Conservation Training Course', at which leaders of student environmental protection associations from 22 nationally renowned universities discussed Chinese biodiversity conservation issues with government officials, specialists and scholars. The Ministry of Education organized a 'Training Course for Leading Teachers at National Biodiversity Apprenticeship Centre'. The SEPA sequentially organized a 'Training Course for Biodiversity and Bio–security Managemen' and a 'Training Course for Management of National Biodiversity Protection and Nature Reserves'. The CAS organized several national biodiversity conservation training courses. BGCI, cooperating with CAS, co–hosted seven seminar/training courses on biodiversity conservation for Chinese botanic gardens. IUCN China Committee, related governmental departments and organizations jointly hosted a Conference on 'National Biodiversity Conservation and Sustainable Use'. WWF and Sichuan University jointly organized training sessions covering indigenous knowledge and biodiversity. As a result of an increasing pool of expertise, China has acquired greater plant diversity knowledge and professional know–how.

Based on the personnel training, basic theoretical research and technical innovation related to wild plant conservation has reached a higher level. The *Ministry of Science and Technology*, *National Natural Science Fundation*, local government at all levels and related departments have raised substantial funds and completed several national key science projects. These include 'A Study on Biodiversity Conservation in Key Zones in China', in which systematic research on conservation assessments for wild plants, conservation mechanisms and conservation theory and techniques was conducted. To improve information exchange between plant conservation practitioners, and take forward the conservation of China's wild plants, the Chinese Association of Wild Plant Conservation was set up in Beijing in 2003. Afterwards, the Association successively established the *Orchidaceae* plants Conservation Committee and the *Taxus chinensis* Conservation Committee.

Existing Problems

Construction of plant conservation institutions is unsatisfactory and many local governments have not established specialized institutions for wild plant conservation. There are few laws that relate to wild plant conservation and some *provisions of the Regulations of Wild Plant Protection* are out of date. Protection and motivation for people working on plant conservation is lacking. There is a general deficit of plant conservation practitioners, and management personnel, particularly those with practical experience technicians and local practitioners are not systemically trained. Investment in plant diversity conservation and training is insufficient.

Action Plans

Action 15.1 Strengthening the institutions construction of plant diversity conservation

China will improve wild plant conservation institutions at provincial (municipal city and autonomous region) level as a priority, enhance the construction of forestry stations at country and township levels, and strengthen non–governmental organizations management of wild plant conservation, allowing related associations to fully contribute to wild plant conservation.

Action 15.2 mproving laws and regulations and enhancing the capacity of administration, law enforcement, supervision and management

China will amend the *Regulations of Wild Plant Protection* to increase its flexibility and feasibility,

increase and improve the coverage of the legal system and speed up local government law-making for wild plants, reinforce professional training, facilities and equipment for law enforcement personnel in order to boost their capacity and assure the implementation of laws and regulations relating to plant conservation.

Action 15.3 Strengthening personnel training in plant conservation skills

China will encourage universities to adjust the structure of professional fields, and appropriately increase faculty members related to the plant diversity conservation profession, reinforce higher level training for professionals at universities and scientific research institutes, as well as increase in-service training for local personnel to improve their quality.

Action 15.4 Enlarging investment for facilities construction

China will increase investment in plant conservation facilities and enhance the capacity and efficiency of plant conservation, actively seek various kinds of assistance projects for plant conservation from foreign governments, foreign non-governmental organizations and individuals.

Action 15.5 Consolidating science and technology supporting capacity for plant diversity conservation

China will actively develop research on plant diversity innovation and further improve the mechanisms for developing and transferring technology, enhance the capacity of technological professionals who are capable of innovation, formulate leaning policies to motivate plant conservation practitioners, reinforce science and technology supporting capacity for wild plant diversity conservation.

Target 16 Establishing networks for plant conservation

Current Status

China has established a preliminary Nature Reserve Network that includes a range of ecosystem types, more rationally coverage of geographic zones, and providind agreater scope of functions. Network systems including a Chinese Botanic Garden Network, a Chinese Forest Biodiversity Monitoring Network, and an East Asian Plant Genetic Resource Network have been established. Twenty-six nature reserves in China joined in the '*Man and the Biosphere*' reserve Network. Other relevant networks include the *Botanic Garden Working Committee of CAS*, *the Botanic Gardens Committee*, *the Chinese Botanic Association*, *the Botanic Gardens Conservation Branch of the China Society of Environmental Science*, *the Specialized Committee of Ex Situ Conservation*, *the Chinese Botanic Association*, *the Specialized Committee of Botanic Gardens*, *the Chinese Public Parks Association and the Chinese Wild Plant Conservation Association (CWPCA)*. China maintains comprehensive cooperation with many international organizations, states and regions including the *World Bank*, *UNDP*, *UNEP*, *BGCI*, *FFI*, *IUCN*, *Germany*, *Britain* and *East Asian* countries. China has hosted a series of international conferences related with plant conservation and a number of international cooperation projects on biodiversity such as, the '*China-EU Biodiversity Project*', the '*China Biodiversity Partnership Framework Project*', the '*Sino-American Joint Exploration of West Sichuan Biodiversity Project*', the '*Sino-Britain Cooperation on Restoring Mountainous Plant of the Li River Basin Project*', the '*Sino-German Agricultural Biodiversity Sustainable*

China is the first Coordinator of the East Asian Botanic Garden Network

In April 2005, proposed by BGCI, Tokyo hosted the first East Asian Botanic Garden Working Meeting, delegates from China, Japan, South Korea and Hong Kong, P.R.C. sent delegations attended this meeting. During the meeting, participants discussed a series of issues such as cooperation between East Asian botanic gardens, personnel exchange and training, plant material and research data exchange, implementation of targets of BGCI agenda, GSPC implementation and jointly applying funds. Delegates also exchanged views and opinions on the current the status of their botanic gardens, development trends, and achievements they gained.

The meeting decided to establish the 'East Asian Botanic Garden Network' and unanimously recommended China as the first coordinator of the Network. In August 2006, the organization formally established assembly and first conference was convened in Kunming. Delegates from major botanic gardens of China, Japan, South Korea, North Korea, Mongolia, Russia, and Taiwan, P.R.C.,Hong Kong, P.R.C., Macau, P.R.C.

Development Management Project', the '*China Endangered Magnoliaceae species Protection Project*', and the '*Forest Biodiversity General Monitoring Project*'. China announced the '*Kunming Declaration on Asian Tropical Forest Protection*'.

Existing Problems

Communication and cooperation within the Nature Reserve and Botanic Garden Networks and other environmental protection institutions needs to be improved. An interactive network with conservation organizations on regional and international levels has not been formed. Investment in the establishment and maintenance of a plant conservation network is insufficient.

Action Plans

Action 16.1 Strengthening the network construction of domestic institutions and sites for plant conservation.

China will establish databases at national, provincial and local levels, and improve communication between them; strengthen unified coordination and management between related protection institutions; enhance contacts within the Networks of nature reserves and botanic gardens, as well as with other environmental protection institutions.

Action 16.2 Actively taking part in international exchange and cooperation

China will actively participate in interactive networks of regional and international plant conservation, strengthen its leading role in regional plant conservation activities, particularly improve cooperation with neighbouring countries, establish several trans-border nature reserves, actively participate in international plant conservation organizations and vigorously implement related obligations under international conventions, enhance personnel and information exchange through international cooperation and expand international cooperation areas for wild plant conservation.

Appendix I 'Living fossil' plants of China

1. Ginkgo biloba L. ('yin xing')

This species, also known as 'white fruit' (bai guo), the only surviving species of Ginkgoaceae, is the famous living fossil plants of the species, the famous 'living fossils'. During the Mesozoic Jurassic Period, it has been widely distributed in the northern hemisphere and began recession in the Late Cretaceous. When the Quaternary glaciers fell, this species became extinct in Europe, North America and most regions in Asia. Wild Ginkgo plants survive in the western mountains of Zhejiang province in China. As individuals are scarce, dioecious, the residues will be replaced if they are not strictly protected and natural regeneration are not promoted. This species is a valuable timber and dried fruit tree. It is also of great value in phylogenetic studies of gymnosperms, ancient flora, paleogeography and Quaternary glaciers climate because of its primitive traits. It is a beautiful garden ornamental tree because of its exquisite and marvelous leaves. Its seeds can be used as dried fruits. Leaves and seeds can be used as medicine. Currently, China's ginkgo resources are mainly found in more than 60 counties and cities of Jiangsu, Shandong, Zhejiang, Anhui, Fujian, Jiangxi, Hebei, Henan, Hubei, Hunan, Sichuan, Guizhou, Guangxi, and Guangdong Provinces.

2. Davidia involucrate Baill. ('gong tong')

Davidia involucrate, also known as water pears, pigeons tree, is the relict plant surviving from 10 million years ago. It is a deciduous tree belonging to the family Nyssaceae. Its leaf shape is broadly ovate with heart-shaped base and leaf margin is serrated. During April and May when its white flowers in full blooming, two giant white bracts at the base of flowers dance with the wind like pigeon soaring. It is a valuable ornamental plant in the world. Davidia involucrata is endemic to China and mainly distributed in western Hubei, Sichuan, Guizhou, and few mountainous areas of Yunnan. This species has been cultivated gradually in the world since it was introduced from China to Britain in 1903.

3. Liriodendron chinense (Hemsl.) Sarg. (ezhang qiu)

Liriodendron chinense, belonging to the family Magnoliaceae, is a deciduous tree up to 40 metres tall and over one metre in D.B.H. The leaf arrangement is alternate and leaf shape looks like goose feet. This species and Liriodendron tulipifera Linn. are famous relic sister plants. Liriodendron plants fossils were found in Europe, Greenland and Japan dating from Cretaceous period of geological age. Liriodendron plants have been extensively distributed in northern hemisphere before the glacial epoch of Cenozoic era, but most of them became extinct after the invasion of glacier. Today, only those two discontinuous distribution species are left. Therefore, Liriodendron chinense is scientifically valuable for Palaeobotany, plant systematics and phytogeography studies. Now, they are scattered in Anhui, Zhejiang, Jiangxi, Fujian, Hunan, Hubei, Guangxi and Yunnan provinces.

4. Metasequoia glyptostroboides Hu et Chang ('shui shan')

Metasequoia glyptostroboides, belonging to the family Taxodiaceae, is a deciduous tree, endemic to China and the world famous relict plant and a "living fossil". This species occurred on the earth and was widely distributed in the northern hemisphere in the far Mesozoic Cretaceous period. These plants almost entirely disappeared after the Ice Age.

In Europe, North America and East Asia, Metasequoia fossils were found in strata from the Late Cretaceous to the new century. In 1940s, the survivors of the huge metasequoia trees older than 400 years were found by Chinese botanists in Mo Dao Xi where is the junction of Sichuan and Hubei provinces. The remnants of the metasequoia plants were found in Shui Shan dam and small rivers of Lichuan County in Hubei province. Plants with 20 centimeters in diameter are more than 500. A large number of tree trunks and touting were found in farmlands and valleys. Trees with more than 200–300 years were found in Leng Shui of Shi Zhu county of Sichuan province and Luo tower and Ta Ni Lake of Longshan County of Hunan Province. It is important for studies of ancient plants, ancient climate, paleogeography and geology, and phylogenetic studies of gymnosperms. In addition, it is a beautiful tree with beautiful shape, high and straight trunks, and fast-growing features. It is also an excellent tree for greening in subtropical regions as well as fast-growing timber species. Today, metasequoia plants have been widely cultivated in China and introduced in major foreign Botanic Gardens.

5. Alsophila spinulosa (Wall. ex Hook.) RM Tryon. (suo luo)

Alsophila spinulosa, also known as tree fern, a species of the family Cyatheaceae, is the only surviving woody fern. It was the most prosperous plant on the earth before 350 millions years. Together with dinosaur, they were two signs of 'Reptiles' era. Most Alsophila spinulosa plants on the earth died after a long geological changes and only a very small number could be traced in few 'refuge areas'. There is a Mutt belt forest, the smallest forest ecosystem nature reserve in China, adjacent to Lezhu village of Nanjing county of southern Fujian province. The Mutt belt forest is also a'rare multi-level original monsoon rain forest in the world' where rare plants Alsophila spinulosa can be found. In eight species with grade one national conservation status, Alsophila spinulosa ranks the first. Cyatheaceae plants are primitive and widely distributed on the earth in the Mesozoic. Distributions of existing species are reduced and many species are endemic to the local. It is an ideal plant for the study of speciation and phytogeographic distribution. At present, the distribution area of Alsophila spinulosa has been basically limited to Nature Reserves. A Chishui Alsophila spinulosa Nature Reserve was established in Guizhou province.

6. Pseudolarix kaempferi (Lindl.) Gord. ('jin qian song')

This species belongs to the family Pinaceae. It is a deciduous tree with twenty to thirty leaves clustered on short branches and look like coins hanging along a strings of an umbrella, hence the name. This species is distributed in Asia, Europe, the Americas in the Cretaceous geological age but became successively extinct in the ice age of Pleistocene, only very few residues surviving in the middle and lower reaches of the Yangtze River. It is a single species of a single genus and endemic to China. This species has become an important subject for plant systematic development research because of its unique classification position. It can be found in the southern Jiangsu, southern Anhui, western Zhejiang, northern Jiangxi, northern Fujian, eastern Sichuan, Hunan, Hubei and other provinces. It often grows in low-altitude mountainous or hilly areas and is suitable for cool humid climate. Now it is widely planted as afforestation species.

7. Abies beshanzuensis M. H. Wu (bai shan zu leng shan)

This species, belonging to the family Pinaceae, is the legacy of the Quaternary ice age with the beautiful names 'living fossil plants' and 'Plant Panda'.

It plays an important role in studies of ancient climate, ancient geological changes, paleontology, and Paleo-vegetation fields. Currently, only 3 wild living individuals of this species can be found in

the world. Those individuals only grow at south-west slope (alt. 1,700 meters) of Bai Shan Zu nature reserve which is a national nature reserve of Qing Yuan county, associated with Fagus lucida Rehd. et Wils. This species was listed as one of the world's 12 most rare and endangered species by the international species conservation organization. Species ex-situ conservation has been successful after more than 10 years of careful breeding of forestry experts.

8. Cathaya argyrophylla Chun et Kuang ('yin shan')

It is an evergreen tree, belonging to the family Pinaceae, and the world's rare species and endemic to China. It is called 'Giant pandas' and 'living fossils' in the plant kingdom. There are two silvery white stomatal bands in the lower surface of green linear leaves, which are sliver shiny and look attractive whenever a light breeze blowing, hence the name. This species had been widespread in the Eurasian continent of the northern hemisphere far in the third period of the Cenozoic of Geological age. Its fossils had been discovered in Germany, Poland, France and the former Soviet Union. About 200 ~ 300 million years ago, large glaciers happened on the earth and almost swept across Europe and North America, but glacier forces in the mainland of Europe and Asia were not strong. Some places with unique geographical environment were not attacked by glaciers and became a haven for this species. In 1980, Xu Youyuan, a lecturer at the Department of Forestry, Guizhou Academy of Agriculture, made an inspection in DaShahe forest area with the cooperation of a county forestry department and discovered Cathaya argyrophylla in Xiaoshahe. From then on, more than 1,000 individuals have been discovered in Hunan, Sichuan and Dao Zhen county of Guizhou, and other places.

9. Emmenopterys henryi Oliv. (xiang guo shu)

This species, a deciduous tree, is the only species of the genus Emmenopterys in the family Rubiacea. It is also one of the ancient relict species surviving the Quaternary glaciers. It was first found in the forest with an alt.670-1,340m in Yichang county of the western Hubei province. Wilson, a British botanist, named this species as 'China's most beautiful and attractive tree' in his 'Huaxi Flora'. This species has important scientific value for studies of phylogeny, morphological evolution and geography of Chinese plants.

10. Taxus chinensis (Pilger) Rehd. ('hong dou shan')

Also known as 'zishan' (purple pine) and 'chi bai song' (red pine), this species belongs to the family Taxaceae. It is widely recognized as a rare natural anti-cancer plant on the brink of extinction. It is the legacy of Quaternary glaciers and has been 2,500,000 years of history. This species is endemic to China and located in Gansu, Shaanxi, Sichuan, Guizhou, Yunnan, Hubei, Hunan, Guangxi, and Anhui provinces.

Appendix II Nature Reserves Development in China

Since the first Nature Reserve was established in 1956, the number of reserves had increased only to 45 by 1978. However, the number and the area of reserves have increased rapidly by the end of 2005, China had established 2,349 Nature Reserves with all types, 265 of which are National Nature Reserves. The total protected area grew from 1,265,000 hectares to 149,949,000 hectares, which account s for 14.99% of China' s total land area. 1,648 of these reserves (113,975,000 hectares) are administered by forestry authorities, which is 70.16% of total number of Nature Reserves in China. 272 reserves (23,700,300 hectares) are administered by environmental protection authorities, which is 11.58% of the total number of Nature Reserves and 15.81% of the conserved area. 75 reserves (2,790,300 hectares) are administered by agriculture authorities, 3.19% of the total number of Nature Reserves, and 1.86% of the conserved area. 88 reserves (5,422,100 hectares) are administered by oceanic authorities, accounting for 3.75% of the total number of Nature Reserves, and 3.5% of the nationally conserved area. 66 reserves (1,273,200 hectares) are administered by national resource authorities, 2.81% of the total number of Nature Reserves, and 0.85% of the nationally conserved area. 60 reserves (1,379,400 hectares) are administered by irrigation authorities, which is 2.55% of the total number of Nature Reserves and 0.92% of the nationally conserved area. 16 reserves (167,700 hectares) are administered by urban construction authorities. 124 reserves (1,588,600 hectares) are administered by technology, Chinese medicine, tourism authorities, institutions and universities, which is 5.96% of the total number of Nature Reserves, and 1.06% of the nationally conserved

Development of China's Nature Reserves

Year	*Total number*	*Area (10^4 hectares)*	*Percentage of Land Territory (%)*
1956	1	0.1	0.00
1965	19	64.9	0.07
1978	45	126.5	0.13
1982	106	390.0	0.40
1987	400	2,000.0	2.10
1989	460	2,400.0	2.50
1991	638	5,505.0	5.73
1993	763	6,618.4	6.84
1995	799	7,185.0	7.20
1998	926	7,697.9	7.64
2000	1276	12,300.0	12.4
2001	1551	12,384.0	12.9
2002	1757	12,672.0	13.2
2003	1999	14,398.0	14.3
2004	2194	14,822.6	14.8
2005	2349	14,994.9	15.0
2006	2395	151,535,000	15.16

area.

Nature Reserves across the country protect over 70% of China's natural ecosystem types, 80% of wild animal populations, and 60% of higher plants and critical natural relics. A range of rare and endangered plants such as Davidia involucrate, Cycadaceae, Orchidaecae, and Metasequoia glyptostroboides have been significantly restored and developed in terms of population numbers. At the same time, these Nature Reserves play important roles in protecting reservoirs, maintaining soils, regulating climate, providing a windbreak to slow desertification, and improving the general environment. Policies, laws and regulations, and criteria related to Nature Reserves have been preliminarily established in China. Hence a more complete management system for Nature Reserves has been developed. China has preliminarily established a scientific research monitoring system and promoted public education. China, using reserves as the carrier, actively participate in the international cooperation of natural protection and establish a good international image in the conservation of biodiversity and the natural environment. Twenty-six nature reserves in China have joined the UNESCO 'Man and the Biosphere' network of protected areas and 30 nature reserves were included in the International Importance Wetlands List.

Appendix III Six Major Forestry Projects in China

At the turn of the century, the Chinese government adheres to people-centered principle, establish and implement forestry development strategy mainly focused on ecological construction, establish the ecological civilization construction of land ecological security system and beautiful landscape centered on forest vegetation. The Chinese government implemented six major forestry development projects including the protection of natural forest resources, the reduction of farming and regeneration of forest projects, treatment of sandstorm source project in Beijing and Tianjin, 'Three North (the west of Northeast, the north of North China, and most parts of Northwest)' and the middle and lower reaches of the Yangtze River and other key shelterbelt projects, the protection of wildlife and nature reserve construction projects, and key forestation zones for fast-growing and rich harvesting timber production.

Over 97% of counties, municipals, districts and 'banners' (administrative area for ethnic minority groups) are involve in these six projects. Over 76 million hectares are planned forestation. The planned investment amounted to more than RMB 700 billion for the construction of resource conservation, land territory greening, soil erosion treatment, desertification prevention and management, wetland conservation, biodiversity conservation and commercial forest development.

1. Natural forests conservation project

This project includes three levels : natural forests logging in the upper reaches of the Yangtze River, and upper and middle reaches of the Yellow River will be halted; timber production of key state-owned forests in north eastern China and Inner Mongolia will be significantly reduced; natural forest of other areas will be well taken care of by the local governments. The project aims to reduce timber yield 19.91 million m3, manage and protect forests 0.10 billion hectares, divert and settle surplus workers 740,000. The objectives of the project during the years of 2000 and 2010 are the followings:

First, to properly protect 64.26 million hectares of existing forests of the upper reaches of the Yangtze River, the upper and middle reaches of the Yellow River, reduce the consumption of forest resources 61.08 million m3, and reduce the volume of timber yield 12.39 million m3. About 15.4 million hectares of new forests and grasses will be increased by 2010, of which 9.10 million hectares are new additional forests. 3.72% of forest coverage in the project area will be increased.

Second, 7.515 million m3 timber output of key state-owned forest areas in Northeast China and Inner Mongolia will be reduced so that 34.65 million hectares of forests can be protected and managed effectively, 484,000 surplus workers can be properly diverted and settled. The strategic transfer of enterprises and rational readjustment of the industrial structure can be achieved and be managed sustainably.

2. Key shelterbelt construction project of 'Three North' and the middle and lower reaches of the Yangtze River and other places

This is the biggest shelterbelt forest project in China, which includes the shelterbelt construction of 'Three North' areas, the coast and Pearl River, Huaihe River, the Taihang Mountains and the plains region and the Dongting and Poyang Lake, The

middle and lower reaches of the Yangtze River. The project plans to reforest 23.8 million hectares, to effectively protect 0.08 billion hectares of forest. In 1989, 1990, 1987, 1994, 1996, some construction projects were initiated including shelterbelts along the upper reaches of the Yangtze River, coastal shelterbelt, plain greening, Taihang Mountain greening, and shelterbelt systems in Pearl River Basin. The first stage of five shelterbelts project in middle and lower reaches of the Yangtze River had been completed at the end of 2000.The second stage project planning organized by the State Forestry Bureau were completed in 2000, which planned to afforest 174.977 million hectares. The fourth stage project planning of 'Three North Shelterbelt' approved by the State Development Planning Commission formally launched in 2001. Thirteen provinces, autonomous regions, and 590 counties (banners, city, District) of municipalities directly under the Central Government, total area of 4.053, 9 million km2, accounting for 42.2% of the total land area, are involved in the 4th stage of 'Three North Shelterbelt' projects. By 2010, based on the effective protection of existing 27.87 million hectares of forest resources, 9.5 million hectares of afforestation will be completed, 1.84% of the forest coverage rate will be increased within the construction area, a batch of relatively complete systems of regional shelterbelt will be built, the trend of ecological deterioration in 'Three North' regions will be initially curbed.

3. Returning farmland to forests and pastures

This is a major strategic decision by the CPC Central Committee in view of the erosion of water and soil increasingly exacerbated. A total of 1,897 counties (including city, district or banner) in 25 provinces and the Production and Construction Corps of Xinjiang are involved in this project. The construction task focuses on the western region of China. Priorities are given in important areas of arable land in the sources of rivers and their both sides, the steep farmlands surrounding lakes and serious soil erosion and sandstorms areas. About 856 key counties in the upper reaches of the Yangtze River, the upper and middle reaches of the Yellow River, sandstorm source areas in Beijing and Tianjin and important lake catchment areas, the Red River basin, Heihe River Basin, Tarim Basin and other areas were set as the key counties for the construction, 29.9% of total number of counties in administrative divisions of China. In 2010, 0.02 billion hectares of reforestation will be completed by the project, 0.02 billion hectares afforestation in barren hills and wastelands where are suitable for afforestation (two types of reforestation were included in returning farmland to forest experimental task in 1999–2000), afforestation in steep farmland, and farmland with serious desertification will be basically treated, 0.03 billion hectares of new vegetation will be added, 4.5% of grass coverage rate in project area will be increased, the ecological environment in the project management area will be greatly improved.

4. Desertification prevention and management surrounding Beijing

This is the key ecological projects based on the special location of Beijing and with the urgency of improving ecological conditions, mainly to solve the serious problem of sandstorm hazards in the regions around the capital. The project areas stretche from Damao Qi of Inner Mongolia in the west and Alukerqinqi of Inner Mongolia in the east, the southern front stretching from Dai County of Shanxi Province, and ends at Dong Ujimqin Banner of Inner Mongolia. About 75 counties (banners) of five provinces (autonomous regions, city) including Beijing, Tianjin, Hebei, Shanxi and Inner Mongolia are involved in this projects. The total population in the project area is 19.58 million, a total area of 458,000 km2, 101,200 km2 of desertification area. This project takes the comprehensive management measure mainly focused on the construction of forest

and grass vegetation. Three measures are included:

1) Forestry measures, including the 2.76 million hectares of returning farmland to forest, of which 1.41 million hectares are of returning farmland to afforestation, and 1.35 million hectares are matched with barren hills, wasteland, and desert afforestation; 5.19 million hectares are afforestation, of which 1.37 million hectares are artificial forests, 1.95 million hectares are aerial seeding forests, 1.87 million hectares are afforestation by closing hillsides.

2) Agriculture measures, including artificial grass 1.56 million hectares, 0.30 million hectares of aerial seeding grass, 2.93 million hectares through fencing, 0.36 million hectares of basic pasture and 41,300 hectares of grass seeding bases, 5.97 million hectares of grazing prohibition, building shed 2.86 million m2, purchasing 23,100 sets of fodder machinery.

3) Water measures, including 66,059 water projects, 47,830 water-saving irrigation, small watershed comprehensive management 23,445 km2, 180,000 people will be relocated for the purposes of ecological conservation. In 2010, the controllable desertification lands in the project area can be basically controlled, the ecological environment will be improved remarkably, sandstorms weather is significantly reduced, generally halt the expansion of desertified lands, and the ecological environment surrounding Beijing will be significantly improved through biological measures including the protection of existing vegetation, afforestation, aerial seeding afforestation, artificial afforestation, forest building, and turf management, and engineering measures such as the comprehensive management of small watershed.

5. Wildlife Protection and Construction of Nature Reserves

Wildlife protection and construction of nature reserves, mainly to solve the species protection, nature conservation, wetlands protection and other issues. Implementation of the project covers natural ecosystems with typical representation, natural distribution areas of rare and endangered wild animals and plants, ecologically fragile areas and wetland areas, and so on. The following three points will be implemented during 2001–2010.

First, the completion of 15 wildlife conservation projects including pandas, golden monkey, the Tibetan antelope, Orchidaceae plants et al.;

Second, the building of 200 Nature Reserves of typical forests, wetlands and desert ecosystems, 32 demonstration projects of wetland protection and rational use, and 50,000 small areas of nature reserve.

Third, the establishment of gene bank of germplasm resources of national wildlife, state-level scientific research systems of wildlife and the monitoring network. To 2010, the total number of National Reserve will be increased to 1,800 in which 220 are at national level. Nature reserve area will be up to 16.14% of total land area of China.

6. Forestry base construction focused on fast growing and rich harvesting timber production in key regions

The State Council has agreed to take corresponding measures to support the project. Working areas based at the east to 400 mm equipluve, priorities are given to southern Guangdong, Guangxi, Hainan and Fujian in the tropical and subtropical zones, the middle and lower reaches of the Yangtze River regions in North subtropical zone, the middle and lower reaches of the Yellow River regions in temperate zone(including the Huaihe River, Haihe River valley) and the northeast Inner Mongolia regions in cold temperate zone, which belongs to the

scope of east to 600mm equipluve with good natural conditions and site conditions (in principle, the site index should be above 14), more gentle terrain, not easy to cause erosion and affect the ecological environment. About 18 provinces (districts) and other areas suitable for the development of fast-growing and rich harvesting forests will be involved in this project. The priority was also given to the forest industry belt for industrial raw material in the southern China during 2001–2005; The wood production belts in the south and north for fast-growing and rich harvesting timer will be completed in 2006–2015; The construction of green industrial belts of fast-growing and rich harvesting timer in the southern and northern China will be completed by 2015, which can provide 40% of domestic demand for timber production. In addition to the harvesting use of existing forest resources, domestic timber supply and demand are basically in balance. After the completion of all bases, they can provide 133.37 million m3 of timber, sustain 13.86 million tons of the pulp production capacity and 21.5 million m3 wood-based panel production capacities, and provide 15.79 million m3 of large-diameter timber.

Appendix IV Global Leadership for Plant Conservation–China: A Brief Report of Workshop,Beijing,China,7–10 November 2006

Executive Summary

In 2002 the Parties to the *Convention on Biological Diversity* agreed an ambitious Global Strategy for Plant Conservation (GSPC) with an overall objective to halt the current and continuing loss of plant diversity. This report is an outcome of a high–level workshop held in China to promote national implementation of the GSPC in the country which has 10 percent of the world's total flora. The workshop held in Beijing from 7–10 November 2006 brought together representatives of the government agencies in China involved in biodiversity conservation and sustainable development, together with representatives from the UK Government, international NGOs and the CBD Secretariat. The aims of the meeting were to:

* Highlight progress already underway in China to meet the 16 targets of the GSPC by 2010;
* Introduce the UK model of GSPC implementation and promote UK/China partnership;
* Promote a China response to GSPC through the development of an action plan making China a world leader in plant conservation.

Participants in the workshop agreed that China has already made significant progress towards meeting the targets of the GSPC. It is now important to develop a national action plan for the Strategy to integrate and unify existing plant conservation efforts. The GSPC provides an important platform to unify, coordinate and make best use of resources within the country and demonstrate leadership regionally and globally.

It was agreed at the workshop that the best way to develop the national GSPC action plan would be to work through a GSPC Focal Point structure comprising three representatives from the State Environmental Protection Administration (SEPA), State Forestry Administration (SFA) and the Chinese Academy of Science (CAS). This would reflect the political and technical strengths in Chinese biodiversity conservation with a strong focus on plants. It would also promote harmonization of the work of the three leading organizations with responsibility for CBD implementation, national biodiversity conservation and conservation carried out by botanic gardens.

Under the leadership of the Focal Point, a small working group would be established to draft the national GSPC action plan. A technical meeting will be held early in 2007 to draft the action plan building on discussions at the Beijing workshop and the various related plans that exist or are in development. Elements from these would be adapted to reflect the 2010 targets of the GSPC and these in turn will be harmonized to reflect longer term biodiversity conservation goals for China. Observers from the CBD Secretariat, BGCI, and other appropriate organizations will be involved in developing the plan in an advisory capacity. Following the drafting meeting there would be a period of consultation involving a wide range of stakeholders. It is the intention to highlight and discuss the national action plan at the 3rd Global Botanic Gardens Congress to be held in Wuhan, China in April 2007. BGCI will call for international support for GSPC implementation in China at the Congress and will help with the development

of specific projects in support of its implementation. Subsequently it is anticipated that the GSPC China action plan will be launched at CBD SBSTTA in 2007 and the outcomes will also feed into the 9th CBD Conference of the Parties (2008) where the GSPC will be reviewed in depth.

Positive outcomes of the meeting and an agreed way forward reflected the fruitful discussions throughout the workshop with a genuine commitment of all participants to working in partnership at an organizational, national and international level. The development and implementation of the Chinese response to the GSPC will be seen by all as one of the most positive, innovative and collaborative approaches to the conservation of the world's imperilled flora.

Acknowledgements

The Global Leadership for Plant Conservation – China Project is supported by the UK Government through the World Summit on Sustainable Development (WSSD) Implementation Fund. BGCI is most grateful to Defra and JNCC for enabling the project to be implemented as a partnership activity. Additional support for the high-level workshop was provided by HSBC through the 'Partnership for Plants' programme of the Investing in Nature Partnership. The workshop was hosted on behalf of the Chinese Government by the Chinese Academy of Sciences in association with the State Forestry Administration and the State Environmental Protection Administration. Dr Jia Jiansheng expressed gratitude on behalf of the Chinese Government to all the participants in the workshop noting the valuable contributions from overseas experts who offered concern and support for wild plant conservation in China. The workshop was jointly and efficiently chaired by Professor Huang Hongwen and Professor Stephen Blackmore. Logistical arrangements for the workshop were made by Anle Tieu, Barbara Bridge and Tang Yinzhu. Excellent simultaneous translation was provided by Easy Dialogue Business Service. A visit to the Beijing Botanic Garden was generously arranged for participants by Professor Zhang Zuoshang. Sincere thanks are also due to UK Ambassador William Ehrman and his wife Penny for hosting a dinner at the Ambassador's Residence.

List of Acronyms

BGCI	Botanic Gardens Conservation International
CAS	Chinese Academy of Sciences
CBD	*Convention on Biological Diversity*
CBD SBSTTA	*Convention on Biological Diversity* Subsidiary Body on Scientific & Technical Advice
CWPCA	China Wild Plant Conservation Association
CITES	*Convention on International Trade in Endangered Species of Wild Fauna and Flora*
COP	Conference of the Parties
Defra	Department for Environment, Food and Rural Affairs (UK)
GBIF	Global Biodiversity Information Facility
GEF	Global Environment Facility
GIS	Geographical Information System
GPPC	Global Partnership for Plant Conservation
GSPC	Global Strategy for Plant Conservation
HSBC	HSBC Holdings (formerly The Hong Kong and Shanghai Banking Corporation Ltd.)
IPA	Important Plant Area
IPGRI	(formerly The International Plant Genetic Resources Institute – now known as Biodiversity International)
IUCN	World Conservation Union

JNCC	Joint Nature Conservation Committee
MA	Millennium Ecosystem Assessment
MDG	Millennium Development Goals
NGOs	Non Governmental Organisations
RBG	Royal Botanic Garden
SFA	State Forestry Administration
SEPA	State Environmental Protection Administration
UNEP	United Nations Environment Programme
WCMC	World Conservation Monitoring Centre
WSSD	World Summit on Sustainable Development
WWF	Worldwide Fund for Nature
XTBG	Xishuangbanna Tropical Botanic Garden

Introduction

This report presents the discussions and conclusions of a three-day workshop held in Beijing, China from 7–10 November 2006 to discuss national implementation of the CBD Global Strategy for Plant Conservation (GSPC) in the country. The aims of the workshop were to:

* Highlight progress already underway in China to meet the 16 targets of the GSPC by 2010;
* Introduce the UK model of GSPC implementation and promote UK/China partnership;
* Promote a China response to GSPC through the development of an action plan making China a world leader in plant conservation.

A list of workshop participants is provided in *Annex*. The workshop consisted of presentations as included in this report and discussions based on a series of background documents. Participants at the workshop introduced the draft China Wild Plant Action Plan being prepared by SFA and the *Xishuangbanna Statement* on the development of a National Conservation Agenda for Botanic Gardens in China. Further information on the *Xishuangbanna Statement* is provided in Box 1 below. These two documents provide excellent framework documents for the development of a national implementation plan. During the meeting, the recommendations from these two documents

Box 1 *Xishuangbanna Statement*

*A meeting of leading botanic gardens in China was held at the **Xishuangbanna Tropical Botanic Garden** (XTBG) from 26–27 February, 2004 to review the development and need for a National Conservation Agenda for Botanic Gardens in China. The meeting was hosted by XTBG, organised by XTBG and **Botanic Gardens Conservation International** (BGCI), in collaboration with the Chinese Academy of Sciences (CAS) and supported by HSBC through the Investing in Nature initiative. The meeting was attended by directors and senior staff of fourteen institutions and organisations and included 23 participants.*

*Participants noted the importance of international initiatives in relation to the conservation of plant diversity, including the **Global Strategy for Plant Conservation** (adopted by the **Convention on Biological Diversity** in April, 2002) and the International **Agenda for Botanic Gardens in Conservation**. The participants pointed out the need for botanic gardens to support the implementation of such international initiatives, as well as to achieve their recognised contributions to the **China National Biodiversity Strategy**, adopted by China in 1994.*

The participants worked on a draft discussion document entitled "National Conservation Agenda for Botanic Gardens in China" prepared by the Institute of Botany, Beijing, CAS made available for the meeting. They elaborated of a series of 24 draft targets for 2010 (a date chose to harmonise it with the targets included in the GSPC) to be achieved by botanic gardens.

were reviewed and an initial table, which is included in the report, was drawn up linking these to the 16 GSPC targets. It was agreed by the workshop that the further harmonisation of these two documents and review in relation to the 30 year wildlife conservation plan developed under the auspices of State Environmental Protection Administration (SEPA) would relate China's progress in biodiversity conservation to the implementation of the GSPC.

The challenges for China: Discussion of national implementation of GSPC and its targets

Workshop participants agreed that significant progress had already been made towards reaching the GSPC targets in China and that there was a good basis for developing a national response by linking different initiatives. Specific challenges raised in discussion include the following.

It will be important to ensure effective collaboration between different agencies, recognizing that nationally there are about 8 government agencies that have a role to play and also that implementation will need to be at different levels given the size of the country. The GSPC should be harmonized with the 30 year plan for wildlife developed by a Council established by SEPA with 17 agencies of Central Government represented. This plan is designed to run until 2030.

It will also be important to take into account other CBD programmes of work to which China is committed, for example the Global Taxonomy Initiative. On the CBD website there are linkages made between the GSPC Targets and related Programmes of work.

In China it will be particularly important to engage with the agricultural sector. Currently modernization of Chinese agriculture is a great threat to the Chinese agricultural heritage of 3,000 years of sustainable agricultural practice.

NGOs are playing a significant role in the implementation of the GSPC around the world and should be fully involved in implementation of the Strategy within China.

National implementation of the GSPC should recognize the current availability and quality of baseline information and the gaps which exist between current knowledge and the actual situation. Regional differences in information availability should be acknowledged with for example the western provinces being less developed and with richer biodiversity.

China has a comprehensive network of protected areas but it will be challenging to ensure that all are effectively managed to ensure that threatened plants are conserved. Likewise there has been good progress in ex situ conservation of plants. It will, however, be necessary to ensure that ex situ conservation takes into account genetic representation and that appropriate provenances are used in ecological restoration.

The following table provides some provisional targets and actions that could form elements of a *Chinese Strategy for Plant Conservation*, based on information from the draft *China Wild Plant Action Plan* and the *Xishuangbanna Statement* on the development of a National Conservation Agenda for botanic gardens.

Elements of Chinese Strategy for Plant Conservation

GSPC Target	*Provisional targets and actions for China*
1	Compile a list of known Chinese plant species or working list that can be widely available. * Setup / strengthen plant herbaria, compile, digitise and publish plant lists (linking to the China Virtual Herbarium project) * Setup an Information System of China's national wild plants operating at three levels: national, provincial and local in collaboration with Ministry of Science and Technology. Make linkages to other initiatives, e.g. Global Taxonomy Initiative and GBIF Contribute to regional and international checklists with a possible focus on specific families – to be identified.
2	Rationalise and compile existing information to produce a preliminary list of threatened plants. Prepare the Second Volume of '*National Key Protected Wild Plant List*'. * Organize a plant species survey throughout the whole country; * Include information on least concern species as well as threatened species; * Link with international *Red Lists;* * Establish regional linkages. Setup a monitoring system for the population status of China's national key protected wild plants Carry out cross-border surveys for non-endemic species Ensure threatened plants are adequately vouchered by well documented herbarium specimens to provide an auditable baseline for subsequent monitoring
	Establish priorities for biodiversity conservation, national guidelines and minimum standards for *ex situ* conservation collections, including population genetics and genetic and molecular diversity management and ensure that they are adopted [by botanic gardens]. Create and disseminate nationally and internationally, protocols, best practices (including information on appropriate technologies) and models for the cultivation and propaga-

3	tion of threatened plants and economic plants of importance to China. Develop models of benefit sharing for local communities, based on native plant diversity to enhance local economies, food security, health care and the conservation of traditional knowledge. Record historical models as well as modern practices. Ensure models and protocols are available across sectors – forestry, agriculture, medicinal plants etc.
4	Establish linkages with WWF regarding the eco-regional approach to conservation. Ensure that all eco-regions are adequately represented – e.g. wetlands / limestone areas in the protected area management programme. Continue to support existing programmes for forest and rangeland conservation. Ensure that conservation measures are effective – especially for threatened plant species.
5	Define 'important areas for plant diversity' before setting targets. Form a comprehensive nature reserve network focused on wild plant conservation. Develop a collaborative national programme for botanic garden support of nature reserves and natural areas ecosystem conservation, particularly through research, inventory and monitoring, the provision of conservation biology expertise and involving where appropriate reintroductions of threatened plants.
6	Ensure the involvement of the Ministry of Agriculture (the target covers agriculture, forestry and rangelands). Establish definition of 'consistent with plant diversity'. Continue to support new programmes focusing on underutilised crops and landraces and raise awareness that the nutritional value of food is important – the focus should not only be increasing yields.
7	Reinforce the *in-situ* conservation of wild plants using nature reserves. Develop at local levels collaborative relationships/partnerships between botanic gardens and nature reserve and land managing agencies to promote ecosystem conservation and protection of threatened plants *in situ*.

	[*Scope of target may include conservation of adequate genetic diversity with a focus on habitat management rather than species conservation.*]
8	Continue the *ex–situ* conservation of national key protected wild plants (using seed, *in vitro* and cryopreservation techniques as appropriate) and establish propagation centres for these. Establish a comprehensive collaborative on–line database on *ex situ* collections in botanic gardens including living collections and seed bank holdings. Include 60% of the [2,000] threatened plants of China in *ex situ* collections by 2010, ensuring that at least [20%] of threatened species are conserved in such collections with adequate genetic diversity of such species, backed up with effective replication of collections where necessary. Develop, implement or participate in recovery and restoration programmes for [10%] of the most critically endangered species, particularly those listed in the *China Plant Red Data Book*.
9	Carry out a cross–sectorial consultation to identify key players – especially in the agricultural sector. Establish a definition of 'major socio–economically important' plants, based on the definitions already being used in the forestry sector. Such plants would include crops, medicinal plants, timber and locally important plants. Establish a comprehensive de–centralised national ex situ collection of [50] economic plants important in China, including cultivars and their wild relatives, maintained in living and genebank collections.
10	Establish collaboration across the various sectors involved, including CAS which is undertaking relevant work towards this target. Establish international linkages to address issues related to Chinese species that are invasive elsewhere (e.g. water chestnut in the USA). Establish medium and longer term goals in relation to climate change.
	Link to CITES implementation and work on medicinal plants. Conduct an evaluation of the species and quantity of imported and exported wild plants

	and identify case studies of sustainable trade in China's wild plants.
11	Encourage the sustainable use of China's wild plant resources: * Develop artificial propagation protocols for useful wild plants addressing critical technical bottleneck problems; * Encourage industrialized management of China's useful wild plants through innovative technologies; * Develop further processing and use of relevant products; * Set up a major technical support system with its own intellectual property. Provide further training in CITES implementation. Formulate more comprehensive laws and regulations in wild plant conservation and implement a management system for permits for the collection of nationally key protected wild plants.
12	Encourage Chinese industries and enterprises to use plants only from sustainable sources. Identify existing activities and initiatives that contribute to this target.
13	Develop a national programme to enhance the participation of local communities in botanic garden conservation activities, particularly related to documenting and safeguarding their traditional knowledge and traditional practices in plant resource management. Promote the use of ornamental and other plants of native/local origin for use by local communities, urban and other authorities and industry for ecological greening, consumption and other landscape purposes and uses, supported by best practice and protocols in cultivation and propagation. Promote the development of medicinal plants for the national pharmaceutical industry to support sustainable development, while at the same time safeguarding intellectual property rights of local communities and sharing benefits with bona fide stakeholders.
14	Promote and raise awareness of the importance of and need to conserve China's wild plants at various levels, e.g.: * State Science and Technology Council; * Government departments; * Departments of culture and education; * Local level conservation institutes. Reinforce the provision of promotion facilities and media and offer education activities to all walks of life.

	Publicise scientific knowledge of wild plants and their conservation. Create environmental education programmes for young people, especially school children, university students and their teachers in [80%] of botanic gardens. Establish a national training programme in environmental education for botanic garden staff with agreed standards/accreditation levels. Establish major botanic garden education facilities as models in each Province and SAR, including in-garden and on-line resources and outreach programmes.
15	Capacity Building for China's wild plant conservation and use: * Setup a national leading group (Advisory Group) on wild plant conservation; * Establish wild plant conservation offices under the Department of Protection of Wild Animal and Plant in the National State Forestry Administration; * Support wildlife conservation institutes in all provinces (including direct municipalities and autonomous regions); * Clarify the management responsibility for wild plants among supervisory administrative departments; * Maximize the influence of Non-Government Organizations and the China Wild Plant Conservation Association in the conservation and sustainable management of wild plant resources. Conduct training for specialists and non-specialists in wild plant conservation in order to build capacity in: * scientific research in the conservation of China's wild plants; * technologies for sustainable use; * understanding the legal basis and system for wild plant conservation; * Fund raising for conservation. Extend the scope of international collaboration in the conservation of China's wild plants: * Reinforce personnel and technical information exchange through international collaboration; * Actively look for projects with foreign aid. Develop botanic gardens as regional and thematic knowledge centres for innovation and sustainable use of native plants of economic importance or potential, particularly addressing local community needs and priorities. Ensure that at least one major botanic garden is operating in [every] Province and SARs in China with capacity for conservation, research and environmental education.

	Establish an effective national forum for botanic gardens reviews of and to support progress towards the achievement of the National Conservation Agenda targets.
16	Through effective networking, establish a broadly-based plant conservation partnership with herbaria, nature reserves and other relevant bodies. Link with international counterparts.

The way forward – developing a national response to the GSPC

During the workshop clarification was sought on the role of the National Focal points for the GSPC. It was pointed out that the main functions are:

1. To promote, facilitate and monitor implementation of the Strategy at a national level;
2. To promote participation of stakeholders within the strategy and facilitate communication between them.

It was agreed that given the complexity of biodiversity conservation in China the GSPC Focal Point should consist of three individuals representing SEPA, SFA and CAS. This would be communicated to the CBD Secretariat with one person nominated for external communications if necessary.

Chinese participants in the workshop representing different agencies all agreed that this is a crucial time to work towards a national response to the GSPC and to develop global leadership in plant conservation. It provides an excellent opportunity to link the work of SEPA, SFA and CAS with that of other agencies including the agricultural sector. It would also promote harmonization of the work of the three leading organizations with responsibility for CBD implementation, national biodiversity conservation and conservation carried out by botanic gardens.

Under the leadership of the Focal Point a small working group would be established to draft the national GSPC action plan. A technical meeting will be held in January 2007 to draft the action plan building on discussions at the Beijing workshop and the various related plans that exist or are in development. Key documents include China Wild Plant Action Plan, developed by the SFA; the *Xishuangbanna Statement* on the development of a National Conservation Agenda for Botanic Gardens in China; and the 30 year plan for wildlife developed by a Council established under the auspices of SEPA with 17 agencies of Central Government represented. Elements from these would be adapted to reflect the 2010 targets of the GSPC which would in turn be harmonized to reflect longer term biodiversity conservation goals for China. Observers from the CBD Secretariat, BGCI, and other appropriate organizations will be involved in developing the plan in an advisory capacity. Following the drafting meeting there would be a period of consultation involving a wide range of stakeholders.

It is the intention to highlight and discuss the national action plan at the 3rd Global Botanic Gardens Congress to be held in Wuhan, China in April 2007. BGCI will call for international support for

GSPC implementation in China at the Congress and will help with the development of specific projects in support of its implementation. Subsequently it is anticipated that the GSPC China action plan will be launched at CBD SBSTTA in 2007 and the outcomes will also feed into the 9th CBD Conference of the Parties (2008) where the GSPC will be reviewed in depth.

Closing remarks

Mr. Jia Jiansheng
Department of Wildlife Conservation, State Forestry Administration in China

I would like to offer my congratulations for the success of the meeting. All three aims of the meeting have been fully met and we have established an impressive national network for plant conservation. The involvement of NGOs has been most welcome and important. On behalf of the State Forestry Administration I would like to thank invited experts particularly those from afar who share our concern for and desire to support wild plant conservation in China. China is very rich in plant diversity and as a member of the CBD we have clear obligations under this. We also want to promote our work internationally reflecting the good image of China. Building on the excellent network established this week we need to strengthen our collaboration in the future, continuing to work with CBD, BGCI and the UK Government. We join hands to conserve wild plants in China and overseas.

Annex participants list

Mr Jia Jiansheng
Deputy Director
Department of Wildlife Conservation
State Forestry Administration
18 Hepingli Dongjie
Beijing 100714, CHINA
Tel: 8610 8423 8528
Fax 8610 8423 8568
Email: jiansheng_jia@yahoo.com.cn

Professor Ma Keping
Institute of Botany
The Chinese Academy of Sciences (CAS)
20 Nanxincun, Xiangshan
Beijing 100093, CHINA
Tel: 8610 8259 9518; 8610 628 36223;
8610 6259 1431 Ext. 6285
Fax: 8610 6259 0835; 8610 8259 1781
Email: kpma@ibcas.ac.cn;
makp@brim.ac.cn

Professor Huang Hongwen
Chair, Chinese Academy of Sciences (CAS)
Botanic Gardens Working Committee
Director, South China Botanical Garden, CAS
Xingke Rd. Tianhe District, Guangzhou
Guangdong 510650, CHINA;
Tel: 8620 3725 2778
Fax: 8620 3725 2711

Director, Wuhan Botanic Garden
Wuhan Institute of Botany, Chinese Academy of Sciences, Donghu Lake, Hongshan
Wuchang, Hubei 430074, CHINA
Tel: 8627 8751 0232; 8751 0815
Fax: 8627 8751 0271
Email:huanghw@mail.scbg.ac.cn;
hongwen@wbgcas.cn

Professor Li De-zhu
Director Kunming Botanical Garden
Kunming Institute of Botany, CAS
Heilongtan, Northern Suburbs, Kunming, Yunnan 650204, CHINA
Tel: 86 871 5223 503; 5223 090; 5223 807
Fax: 86 871 5217 791; 5150 227; 5219 933
Email: dzl@mail.kib.ac.cn

Dr Zhao Shiwei
Curator, Vice Director Beijing Botanical Gardens
Wofisi Road, Xiangshan,
Beijing 100093, CHINA
Tel: 8610 8259 6707
Fax: 8610 6259 1283
Email: zhaoshiwei@beijingbg.com

Professor Genlin Jiao
Fairylake Botanical Garden
Xianhu Rd 160, Liantang Shenzhen,
Guangdong 518004, CHINA
Tel: 86755 2573 2654 (Office)
Fax: 86755 2573 2705
Email: jiaogenlin@21cn.net
Website: http //www.szbg.org

Mr. Fan Zhiyong
Species program Director
WWF China
Room 1609, Wenhuagong
Beijing Working People's Culture Palace
(Laodong Renmin Wenhuagong Dongmen)
Beijing 100006, CHINA
Tel: 8610 6522 7100 Ext. 3288
Fax: 8610 6522 7300
Email:zhyfan@wwfchina.org
Website: http://www.wwfchina.org

Zhao Jun
Third Secretary
Ministry of Foreign Affairs China
No. 2 Chaoyangmen Nan dajie
Beijing 100701, CHINA
Tel: 8610 6596 3258
Fax: 8610 6596 3257
Email: zhao_jun@mfa.gov.cn

Li Xiaoya
China Programme Officer
Fauna and Flora International China Programme
95 XinXiang, 25 Beisihuanxi Road
Haidian District, Beijing 100080,
CHINA
Tel: 8610 6265 8110; 8610 8261 2165
Mobile: 8613810625072
E-mail: xiaoya.li@263.net
dayflower03@hotmail.com

Wang Chunling
Deputy Director,
Department of Wildlife & Plant Conservation,
State Forestry Administration
18 Hepingli East St, Beijing 100714,
CHINA
Tel: 8610 8423 8530; 13601367862
Fax: 8610 8423 8540
Email: wangchunling1966@sina.com

Zhang Zhongjun
Assistant FAO Representation in China
Food and Agriculture Organization of the UN
Jianguomenwai 4-2-151,
Beijing 100600, CHINA
Tel: 8610 6532 2835
Fax: 8610 6532 5042
Email: zhongjun.zhang@fao.org

Profesor Bai Keyu
IPGRI, c/o CAAS,
12 Zhongguancun Nandajie
Beijing 100081,CHINA
Tel: 8610 6216 3744
Fax: 8610 6897 5192
Email: k.bai@cgiar.org
ipgri–caas@cgiar.org

Professor Xu Haigen
Director, Division of Nature Conservation and Biodiversity
Nanjing Institute of Environmental Sciences
8 Jiangwangmiao Street
PO Box 4202, Nanjing 210042,
CHINA
Tel: 8625 8528 7081; 8547 3713
Fax: 8625 8547 3713
Mobile: 1385168 5395
Email: xuhg@public1.ptt.js.cn
xuhgs@sina.com

Mr. Zhu Guangqing
Deputy Director General
Office of Biosafety and Biodiversity Conservation
Department of Nature Conservation
State Environmental Protection Administration
No. 115 Xizhimennei Nanxiaojie,
Beijing 100035, CHINA
Tel: 8610 6655 6323
Fax: 8610 6655 6329
Email: zhu.guangqing@sepa.gov.cn

Tang Yinzhu
Wuhan Botanic Garden
Wuhan Institute of Botany, CAS
Donghu Lake, Hongshan, Wuchang, Hubei, 430074, Wuchang, Hubei, CHINA
Tel: 8627 8751 0007
Fax: 8627 8751 0770
Email: yztang@wbgcas.cn

Zhang Xuejun
Wuhan Botanic Garden
Wuhan Institute of Botany, CAS
Donghu Lake, Hongshan, Wuchang, Hubei, 430074, CHINA
Tel: 8627 8751 0007
Fax: 8627 8751 0770
Email: zhangxj@wbgcas.cn

Professor Jing Xinming
Executive Director, Beijing Botanical Garden
Institute of Botany, Chinese Academy of Sciences
20 Nanxincun, Xiangshan,
Beijing 100093, CHINA
Tel: 8610 6283 6009
Fax: 8610 6259 0348
Email: xmjing@ibcas.ac.cn

Yu Yongfu
Division Chief, State Forestry Administration
China Wild Plant Conservation Association
18 Hepingli Dongjie
Beijing 100714, CHINA
Tel: 8610 84239464
Fax: 8610 64229759
Email: yu_yongfu@sohu.com

Niu Lingjuan
Project Manager, Associate Researcher
Center for Environmental Education and Communications
State Environmental Protection Administration
#1, Yuhuinan Road, Chaoyang District,
Beijing 100029, CHINA
Tel: 8610 8463 4281; 8610 8464 0857;
8610 8463 7722–2304
Fax: 8610 8464 0884; 8610 8463 3417
Email: niulingjuan66@263.net

Professor Zhang Zuoshuang
Director, Beijing Botanical Garden
Beijing Botanical Gardens
Wofosi Road, Xiangshan
Beijing 100093, CHINA
Tel: 8610 6259 1561 （2213 or 1283）
Fax: 8610 6259 1283
Email: zhangzuoshuang@beijingbg.com

Professor Zu Yuangang
Director, Key Laboratory of Forest Plant Ecology
Ministry of Education,
Box 332, Northeast China Forestry University
26 Hexing Rd, Haerbin 150040,
CHINA
Tel: 86451 8219 1517
Fax：86451 8210 2082
mobile：13303 606 068
Email：zygorl@vip.hl.cn

Tanja Ploetz
Information Management and Digital Research Reference &.Research Centre for Environmental Education
China Environment and Sustainable Development
Rm 701 Sino-Japanese Friendship Centre for Environmental Protection
#1 Yuhuinan Road, Chaoyang District
Beijing 100029, CHINA
Tel: 8610 8463 3416(o)
Fax: 8610 8463 6353
Mobile: 13683044045
Email: tangjia@gmx.net

Nigel Birch
Deputy Director, Science & Innovation Network China
British Consulate General, Guangzhou
7/F Guangdong International Hotel
339 Huanshidong Road, Guangzhou 510098, CHINA
Tel: 8620 8314 3029（Office）
Fax: 8620 8333 6485
Email: Nigel.birch@fco.gov.uk

Rachel Wasser
China Program Assistant
IUCN China Liaison Office
2-2-131 Tayuan Diplomatic Compound
No. 1, Xindong Road
Beijing, 100600, CHINA
Tel: 8610 8532 2699 Ext. 103; 8610 6532 5467
Fax: 8610 8532 2693
Email: rachelwasser@iucn.org.cn

Dr Anle Tieu,
BGCI China Programme Coordinator,
c/o Singapore Botanic Garden
1 Cluny Rd, 259569,
SINGAPORE
Tel/Fax: 65 6467 4206
Email: Anle.Tieu@bgci.org

Stella Simiyu
BGCI Global Strategy for Plant Conservation
c/o IUCN Eastern Africa Regional Office
PO Box 68200,Nairobi, KENYA
Tel: 254 20 890 605, 254 721 364 289
Email: sws@bgci.org;
sws@iucnearo.org

Professor Stephen Blackmore
Regius Keeper
Royal Botanic Garden Edinburgh
29A Inverleith Row
Edinburgh EH3 5LR,
Scotland, UK
Tel: +44 (0)131 248 2930
Fax: +44 (0)131 248 2903
Email: S.Blackmore@rbge.org

Dr Chris Cheffings
Joint Nature Conservation Committee
Monkstone House, City Road
Peterborough PE1 1JY
England, UK
Tel: +44 01733 562626
Fax: +44 01733 555 948
Email: Chris.Cheffings@jncc.gov.uk

Dr Alan Paton
Assistant Keeper, The Herbarium,
Royal Botanic Gardens, Kew
TW9 3AB
UK
Tel: +44 (0)208 332 5295/ 5242
Fax: +44 (0)208332 5278
Email: A.Paton@rbgkew.org

Sara Oldfield
BGCI Secretary General
Descanso House
199 Kew Road
Richmond, Surrey TW9 3BW
England, UK.
Tel: +44 (0)20 8332 5953
Fax: +44 (0)20 8332 5956
Email: Sara.Oldfield@bgci.org

Christine Leon
RBG Kew
Centre for Economic Botany
Royal Botanic Gardens
Kew, Richmond, Surrey TW9 3AE
England, UK
Tel +44 (0)208 332 5383
Fax: +44 (0)20 8332 5768.
Email: C.Leon@rbgkew.org

Suzanne Sharrock
Head of Public Awareness and Understanding
BGCI
Descanso House, 199 Kew Road
Richmond, Surrey TW9 3BW,
England, UK
Tel: +44 (0)20 8332 5953
Fax: +44 (0)20 8332 5956
Email: Suzanne.Sharrock@bgci.org

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中国科学院 CHINESE ACADEMY OF SCIENCES

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