



Annual Report 2006

**Xishuangbanna Tropical Botanical Garden
Chinese Academy of Sciences**

31 March 2007

CONTENTS

Message from the Director	1
SCIENCE	3
Project development	4
Research and outreach progress highlights	10
Improvement of research facility	13
Conferences and symposia	15
HORTICULTURE	23
Species Enrichment Project.....	24
New Western Parkway Entrance	25
Collections & Nursery.....	26
Phenological Observation	26
Data management.....	26
PUBLIC EDUCATION	27
Xishuangbanna	28
Beijing	29
Shanghai.....	30
Kunming.....	30
Hongkong.....	30
Europe.....	31
PARTNERSHIP	32
TEAM BUILDING AND TALENT TRAINING	34
VISITS	38
FINANCIAL REVIEW	42
PERFORMANCE TARGETS AND RESULTS	43
PUBLICATIONS	44

Message from the Director



As XTBG approaches its fiftieth anniversary, we are experiencing a major phase of growth, in terms of our living collections, our public outreach and research activities. With this rapid growth also comes the need

for careful and thoughtful planning. During my first year as Director of XTBG, I was pleased to host Professor Sun Xiaoxiang who acted as the chief designer of the new master plan for XTBG. With Dr. Sun's support and guidance, we successfully completed the third and final version of the master plan for XTBG this year. This master plan has received strong support and appreciation from a national top-level scientific committee, chaired by CAS Vice President, Professor CHEN Zhu. The committee also included four academicians who specialize in landscape architecture and related disciplines. In addition to providing a clear idea for a spatial arrangement of different functional sections of XTBG, the plan also serves as a guide for future landscape management. While we fully expect this plan to adapt to changing conditions and management, it currently illustrates our vision for XTBG's future development.

As an essential part of the master plan, we tried to anticipate XTBG's growth and development over the next five years. This five year action plan grew out of a series of brainstorming sessions among senior XTBG scientists and administrators. Compared to previous action plans, this plan focuses on expanding the impact that XTBG could achieve as a research and conservation institution, instead of just listing the number of publications, patents and grants produced by our staff. While our academic and funding achievements have been substantial, we hope to better integrate

our efforts towards practical and applied questions facing Yunnan, China, and the globe.

On August 11, 2006, Professor Lu Yongxiang visited XTBG for the fourth time as the president of the Chinese Academy of Science. Two years ago, when he last visited XTBG, Professor Lu stated: 'Botanical garden is not only just a place for satisfying scientists' curiosity, instead, it needs to be appreciated by and useful to common public, local government and the scientists at home and abroad.' This important statement now has become the guideline for botanical garden development within CAS. During his visit, Professor Lu was satisfied by the progress achieved by XTBG's Species Enrichment Project. He highlighted the necessity, in XTBG's role as one of the national botanical gardens, to preserve and to conduct research on strategic plant resources, especially to meet the country's present and future needs, such as biofuel plant resources.

Another unforgettable event this year was the opportunity to host the annual meeting of the Association for Tropical Biology and Conservation (ATBC). Attended by more than 300 biologists, with more than 200 international participants representing 40 different countries, the meeting was a huge success. The participants greatly enjoyed our Chinese hospitality and efficiency. Representing the largest international organization devoted to tropical biology and conservation, scientists from around the globe discussed current findings and exchanged news. Meanwhile, our colleagues and graduate students also enjoyed this marvelous chance for a face-to-face chat with many well-known scientists. One of the most prominent outputs of the meeting was the 'Kunming Declaration'. The declaration emphasized the great concern shared by tropical biologists everywhere



about the potential tropical biodiversity crisis, particularly in Asia. Asia currently has the highest deforestation rates of any major region in the world.

For 2006, we kept our focus on regional biodiversity conservation. We are actively involved in the 'Biodiversity Conservation Corridor Initiative (BCI)' program. BCI is a large-scale biodiversity conservation action for the Greater Mekong Subregion endorsed by Asian Development Bank (ADB). In late January, Dr. CAO Min led a team from XTBG on a one-month field trip to Cambodia for a preliminary feasibility study. The project aims to help Cambodia to set up the first national botanical garden, and thus enhancing the national capacity in biodiversity management in Cambodia. Additionally, we organized and hosted two training courses at XTBG for the purposes of regional capacity building: 'Training Course on Advanced Techniques in Frugivory and Seed Dispersal' and 'Chinese National Canopy Workshop'. As the first and newly elected president of ATBC's Asian-Pacific Chapter, I have done everything possible to facilitate collaboration among scientists throughout tropical Asia and to enhance our overall capacity for research and conservation.

Meanwhile, we have also been very involved in the local communities of Xishuangbanna. We co-sponsored a master plan study for our hometown, Menglun, and we established a mechanism to promote cooperation between XTBG and the Administrative Bureau for Xishuangbanna National Natural Reserve. We also initiated major programs in the forests surrounding the gardens, including the large mapped forest plot (20-ha) for long-term forest ecosystem study and co-management of the limestone forest (225 ha) in Menglun. XTBG staff has also contributed significantly to reduce poverty in Mengla county. The second phase of garden development has been appointed as one of the key projects for ecotourism by Yunnan provincial government, with a grant totaling 15 million RMB grant.

On February 20, 2007, the third day of the Chinese New Year, the garden received a total of 10,800 visitors, thus setting the record

for the highest number of visitors in a single day to the garden. For a remote garden like XTBG, situated in the rural countryside near the southern Chinese border, which was truly a phenomenal number of visitors. Looking at the crowd, I was immersed in deep thought: What could XTBG provide these visitors to take back with them on their long journey home? How could XTBG use this obvious public interest in the natural world to promote sustainable management of our environment? How could XTBG ensure that future generations would be able to enjoy the beauty and splendor of our gardens?

Dr. CHEN Jin
Director of XTBG

SCIENCE



Project development

Xishuangbanna Biodiversity Conservation Corridors a pilot project sponsored by the Asian Development Bank

Regional economic corridors are expected to play a crucial role in delivering the development agenda in the Greater Mekong Subregion (GMS). But there is concern that increasing development activities in the economic corridors may adversely affect critical ecosystems and high value biodiversity areas resulting in fragmentation of natural landscapes. This would undermine the functioning and performance of the region's ecosystems, thereby threatening long-term socio-economic development and environmental security of the GMS.

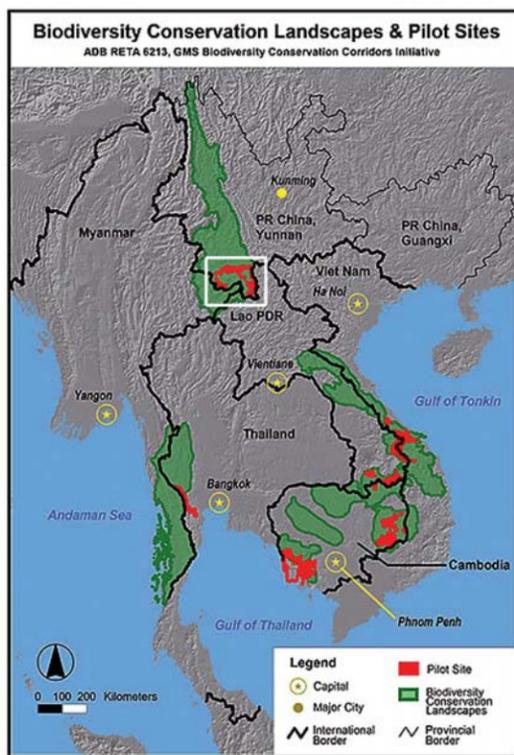
In response to the potential impact, a pilot project to establish the Xishuangbanna Biodiversity Conservation Corridors has been officially launched after a year's preparation by

XTBG scientists and ADB field mission experts.

Based on previous work, in April 2005, the scientists of XTBG proposed to the ADB field mission experts to implement a "great green triangle program" in the border areas of China – Laos – Vietnam, to maintain the ecological integrity and connectivity of the nature reserves. The experts were very impressed by the proposal during their field mission in Yunnan, China. In order to explore potential collaboration among the many conservation partners working in the Mekong region, Dr. Chen Jin led a delegation, which included Drs. Zhu Hua, Hu Huabin and Wang Hong, to visit several research institutions, nature reserves and universities in Vietnam and Laos in December 2005.

The Biodiversity Conservation Corridor Initiative (BCI) is an important component of the Core Environment Program (CEP) in the GMS supported by the Asian Development Bank (ADB). The objective of BCI is to establish sustainable management regimes for restoring ecological connectivity and integrity in a selected set of important biodiversity areas. Major activities include sustainable community development, land use planning and management, restoration of ecosystem services as well as capacity building which will be carried out in Phase I (2006-2008).

For project profile, please visit ADB website:
<http://www.adb.org/Projects/GMS-biodiversity/xishuangbanna.pdf>



GMS BCI pilot sites



Visit of XTBG delegation to National University of Laos



Visit of ADB experts to Xishuangbanna. Mr. Hasan Moinuddin (left 2), ADB consultant for BCI. Dr. Zhu Hua (middle) from XTBG.



Research on Biomass Energy

Since the 1970s, XTBG has been conducting surveys and collections of potentially valuable oil producing plants. During these surveys, scientists discovered that *Jatropha curcas* L. (Euphorbiaceae) might be an important plant for bio-diesel production. Given the high demand for fuel, XTBG researchers have begun to examine the possibility of using *Jatropha curcas* as a resource plant to mitigate future domestic energy crises. Based on the "species enrichment project" implemented in recent years, proposals for further studies on bio-diesel caught the attention of Chinese government agencies and the academic community, including a number of industrial corporations.

Preparatory work for this project includes enrichment of our germplasm resources of *Jatropha curcas* with collections from many different localities and initial observations and research activities about how the plant performs in a plantation setting.

In May 2006, the XTBG deputy director, Peng Daiping, lead a 5 person delegation to India, to observe the development status of biodisel plants, including government policy, involvement of research institutes and industrial sectors.

The Chinese Academy of Sciences has deployed a considerable amount of funds for a joint research project on *Jatropha curcas*. This project is led by XTBG, with the participation of other CAS institutions, including South China Botanical Garden, Wuhan Botanical Garden and the Institute of Genetics and Developmental Biology.



Jatropha curcas L.



Lu Yongxiang, CAS president, on-site observation



Experimental plot of *Jatropha curcas* L.



Jiang Pusheng, CPC secretary of Xishuangbanna prefecture, attentive to the biodisel plant



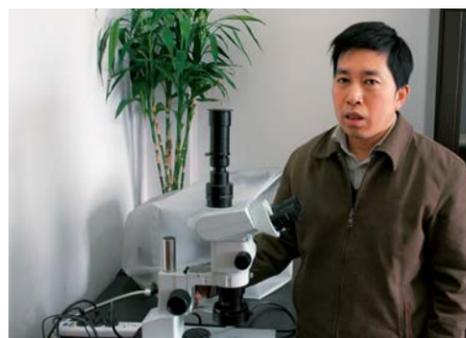
Mr. Peng Daiping(right), deputy director of XTBG, led a delegation to visit Jalandhar Farm in India



Studies on the regulatory mechanism of drought resistance features of plants by small RNAs molecules: a project supported by the High-tech research and development program of China (863 Program)

To XTBG, this is the first project ever awarded by the High-tech research and development program of China (863 Program).

Dr. Yu Diqui and his team, based on his pioneer studies of the biological function of WRKY genes and micro-RNA molecules, have established a solid foundation on plant molecular biology. Dr. Yu's success in obtaining funding from the Chinese high-tech research and development program demonstrates the competitiveness of XTBG researchers to undertake new and important national research programs.

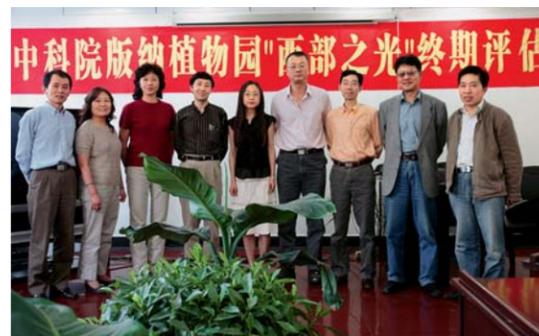


Dr. Yu Diqui

New projects sponsored by the "Light in Western China" Program of CAS

LIWC program was initiated in 1996 by CAS to train talented young researchers, as part of the current campaign for the social and economic development of western China. Two of our young scientists have received funding from this program: Asso. Prof. Yang Xiaodong's research on *Pontoscolex corethrurus* and Yang Qing's research on *Jatropha curcas* L. Since 1997, twelve XTBG staff had been sponsored by the program. With the support of

the Program, a number of encouraging results have been obtained. Recently, Assoc. Prof. Li Qiaoming successfully passed the LIWC end-of-term evaluation on 26 June 2006.



Dr. Li Qiaoming (middle) passing her end-of-term evaluation for CAS LIWC Program

Special research grant from CAS

Dr. Li Qingjun received the special research grant for National Best Doctoral Dissertation Award Winners. Dr. Li's research program *The Propagation Diversity and Evolution of Tropical Plants* has been financially supported from January 2007 to December 2009. Dr. Li is a prominent and leading researcher at XTBG. He has published papers in *Nature*, *Plant Systematics and Evolution*, and the *American Journal of Botany*. He is also a winner of National Science Fund for Distinguished Young Scholars.



Dr. Li Qingjun on his field trip in Tibet

Facts:

In 2006, XTBG mobilized RMB 15.26 million Yuan by contract as research grants for 40 new projects, of which:

- 1 project sponsored by the national high technology research and development program (863 program);
- 1 pilot project funded by national basic research program (973 program);
- 9 NSFC-funded projects;
- 5 YNSF-funded projects;
- 4 projects funded by CAS program for botanical gardens and taxonomy;
- 2 projects supported by CAS key program;
- 1 project sponsored by Sunny Corporate Ltd, Jiangsu Province
- 3 projects funded by Department of Forestry of Yunnan Province
- 1 project from State Reform and Development Commission, and
- 13 projects sponsored by other sources.

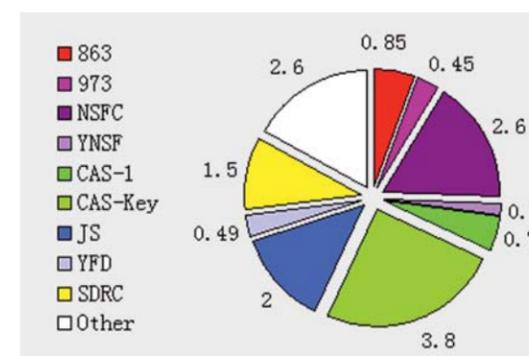


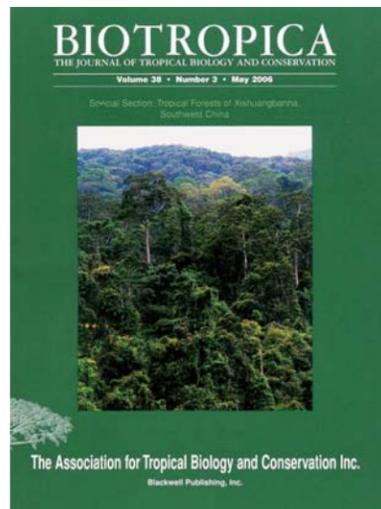
Figure 1 Research Funds (million) by Sources



Research and outreach progress highlights

Biotropica Special Section

Biotropica, the international publication of the Association for Tropical Biology and Conservation, produced a special section in 2006: *Tropical Forests of Xishuangbanna, Southwest China* in Volume 38 Issue 3 Page 306-347, 2006. Six articles by XTBG scientists were included in this section, covering a wide range of topics, including biogeography, floristics, forest structure and biomass, soil seed bank composition and litter-fall decomposition and nutrient cycling. This special section gave XTBG a special opportunity to promote our mission of research and conservation internationally and to help tropical biologists elsewhere obtain a better understanding about the poorly known Chinese tropical rainforests..



Biotropica special section

New adaptive functions of phenolics in shaping honeybee's behavior

Secondary compounds such as phenolics, usually present in floral nectar, may act in combination with sugar components to influence the evolution of pollination mutualism. Previous work on the response of honeybees to floral nectar focused strictly on these secondary compounds, neglecting sugar compounds. Dr. Liu Fanglin and his colleagues demonstrated that phenolic sugar syrups were attractants to free-flying Asian *Apis cerana* Fab. The optimum sugar concentration is around 15–35%, but becomes a deterrent when it is below or above this range. Synergism between nectar phenolics and sugar may thus provide a novel mechanism for plants to encourage pollinating bees and reduce energy investment in nectar, while also operating as exaptations by co-opting defense mechanisms against herbivores. Liu's group also discovered that honeybee foragers can detect and estimate the amount of phenolics in pollen and that foraging activities of a honeybee colony are regulated by quantitative changes in phenolic contents of pollen. Honeybees could, therefore, use non-nutritional factors, such as pollen phenolics, to assess colony requirements and to change foraging dynamics accordingly.



Visit of free-flying Asian *Apis cerana* Fab. to *Tripterygium hypoglaucom*

Getting a buzz from outbreeding

Enantiostyly or mirror-image flower is a sexual polymorphism in which left-styled flowers have anthers deflected to the right, and right-styled flowers have the opposite arrangement. Enantiostyly occurs in two distinct forms. Buzz-pollination is a pollination mechanism in which bees must buzz flowers by rapidly vibrating their indirect flight muscles to release pollen from the anthers, which dehisce only at the tip so that their pollen remains hidden. Buzz-pollination can lead to precise pollen transfer. The Gesneriaceae is a large tropical family with about 3,000 animal-pollinated species in 133 genera. This family exhibits extensive diversity in floral structure, even within genera, which appears to have resulted from adaptive changes in pollination mode. Asso. Prof. Gao Jiangyun *et al.* has suggested that *Paraboea rufescens*, one species in the Gesneriaceae, is enantiostylous and buzz pollinated, based upon their pollination studies of tropical Chinese plants. Floral morphology in *P. rufescens* and pollinator foraging behaviour seems likely to reduce self-pollination and pollinations between flowers of the same stylar deflection.



Flowers of *Paraboea rufescens*

Composition of nonconstituent species as indicator to forest disturbance

The new term 'non-constituent' species is proposed for plant species that occur in

a natural landscape but are not native to it. This new term is basically equivalent to the commonly used term 'invasive' species. Dr. Lin Luxiang and his supervisor Dr. Cao Min hypothesized that fragmentation of continuous forests significantly increases both the richness and the size of soil seed banks of non-constituent species. To test the hypothesis they compared soil seed banks in three small fragments and one large tract of subtropical evergreen broad-leaved forest in Yunnan Province. In total, 249 species were identified in all soil samples from the four sites. They suggest that non-constituent species in soil seed banks could be used as an indicator species group for assessing human disturbance. If so, the richness and size of soil seed banks of non-constituent species could play an important role in quantifying disturbance in forests.



Experiment on seed germination

Biological control of leafhopper (Empoasca viti) in tea plantation in Simao, Yunnan province

The leafhopper (*Empoasca viti*) was found to be an effective natural enemy to control pest in tea plantation. This project awarded the 3rd prize for Scientific and Technological Progress in Yunnan.



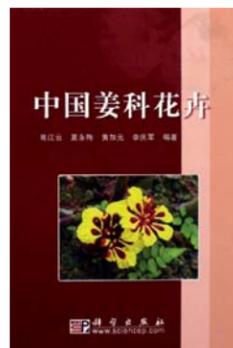
Demonstration on karst upland re-vegetation at different ethnic villages in Southeastern Yunnan Province

Vegetation degradation and its related rock emergence at land surface is a serious problem in Southwest China, where large areas of karst deposit remains. Exotic tree planting and mountain closure are two of the common strategies to be employed to restore vegetation cover. However, local communities and local plant species are excluded. A careful study on the regeneration capacity of degraded karst slope, including existing plant species, soil and seeds that are buried in soil and on local vegetation culture were carried out. A participatory planning process was introduced to facilitate restoration efforts in three ethnic villages in Wenshan Zhuang and Miao Autonomous Prefecture. Local farmers had worked out and implemented their restoration and management plans in the villages. Now, this model was extended to many other karst villages. The achievement received 3rd prize for Scientific & Technological Progress in Yunnan Province.



Investigating trip to one karst village in Southeastern Yunnan

Ginger Plants of China (edited by Gao JY *et al.*)



Certificate of a new variety: *Tectona grandis* Linn. f.



Certificate of a new variety: *Piper hispidimervium* C. DC.



Facts:

In the year 2006, XTBG scientists have achieved the following:

- 41 scientific papers published on internationally peer-reviewed scientific journals (Source Journals of ISI web of Science);
- 70 research papers published on CSCD (Chinese Science Citation Database) referred

- journals;
- 34 papers presented on international conference;
- 1 monograph published by China Science Press;
- 3 invention patents;
- 3 certificated plant varieties.

Improvement of research facility

Large Mapped Forest Plot (20 ha) for Long Term Forest Ecosystem Studies

On 15 February 2006, XTBG and the Administrative Bureau of Xishuangbanna National Nature Reserve (XNNR) agreed to set up a 20 ha forest plot for Long Term Forest Ecosystem Studies. The directors of the two organizations, Dr. Chen Jin of XTBG and Mr. Wang Zhanqiang of XNNR, signed a memorandum of understanding to establish the research project. The research objectives of the forest plot aim at monitoring the long-term dynamics of the tropical rainforest ecosystems and will fit into a global network of such plots administered by the Center for Tropical Forest Science, Smithsonian Tropical Research Institute.

Field mapping and plant inventory work has been conducted and all field work is expected to be completed by the end of April 2007.



XTBG and XNNR agree to set up Large Mapped Forest Plot

Savanna Ecosystem Research Station

In order to accelerate infrastructure construction for research, Dr. Cao Min, deputy director of XTBG, led a team to Yuanjiang River Valley to identify an appropriate site for the Savanna Ecosystem Research Station in January, 2006. With help from the local government, they made excursions to three candidate field sites. Intensive field investigations showed that the vegetation types in the three places are representative of tropical savanna, especially in "Pu Piao", located 32 km to the south of Yuanjiang county proper. On 25 December 2006, an agreement to set up the Savanna Ecosystem Research Station in Yuanjiang was signed between XTBG and the People's Government of Yuanjiang County, Yunnan Province. XTBG experts in collaboration with local support will complete the master plan for the Savanna Ecosystem Research Station soon after a joint field investigation in early 2007.



Site for Savanna Ecosystem Research Station identified



CERN Stations become national field stations for scientific research and observation

The two field stations have been National Field Stations for scientific research and observation, after comprehensive performance evaluation by the experts of MOST (Ministry of Science and Technology). These stations, Ailaoshan Station for Subtropical Forest Ecosystem Studies (ASSFE), and Xishuangbanna Station for Tropical Rain Forest Ecosystem Studies (XSTRE), are part of the Chinese Ecosystem Research Network (CERN). The monitoring work of XSTRE within 2000-2005 was awarded an "excellent" rating at the 14th Annual Meeting of the Chinese Ecosystem Research Network (CERN), held September 21-23 at Xilinhot, Inner Mongolia. These evaluations occur every five years. A panel of 12 experts headed by Prof. Sun Honglie, CAS academician, came to XTBG on April 2 to review the performances of XSTRE and ASSFE. They inspected the condition of laboratory equipment, field facilities in the forests of the two stations as well as infrastructures supported by CERN.

Facts:

- In the year 2006, there were a total of 5,006 new specimens added to the Herbarium, more than 4,250 of them were mounted and identified. Up to now, the database of HITBC consists of all 118,982 specimens of which 113,399 are attached with digital photos.
- The XTBG library administered over 5,000 loans and responded to 561 inter-library requests for information in the year.



Dr. Chen Zhu, CAS vice president, addressing the ATBC 2006

Conferences and symposia

ATBC 2006

XTBG successfully hosted the Annual Meeting of the Association for Tropical Biology and Conservation and five satellite workshops in July in Kunming, China. This event greatly promoted the influence of XTBG in the studies of tropical biology and ecological conservation.

The theme of ATBC 2006 was "Tropical Biology: meeting the needs of changing tropical systems". The topics include biodiversity conservation of the tropics, invasive species, tropical forest and global changes, long-term studies on ecology in the tropics, applications of ethnobotany in tropical biodiversity conservation, ecological evolution, and

restoration of degraded tropical ecosystems, etc.

William F. Laurance, ATBC president, delivered the first report, *Reflections on the Tropical Deforestation Crisis*, of the meeting and answered questions put forward by the participants.

On July 17, CAS vice president Dr. Chen Zhu met with some important participants of ATBC 2006 at the Harbour Plaza – Kunming, including council members of ATBC, invited keynote speakers and major members of the organizing committee.

Many media agencies in Kunming covered the opening ceremony and interviewed some of the eminent scholars at the conference. Over 320 participants (200 from abroad) from 43 countries attended this conference. A total of 17 symposia, 5 keynote lectures, 177 oral



On-site evaluation of CERN experts at Ailaoshan station (ASSFE)



presentations and 62 poster presentations were presented at the ATBC 2006. The Kunming Declaration was published from ATBC 2006.

An Asian Chapter of ATBC was launched in Kunming on July 18. Dr. Chen Jin, director of XTBG was elected as the founding chairman of ATBC Asian Chapter.

ATBC is the world's largest scientific organization devoted to the study, conservation, and wise use of tropical ecosystems. Founded in 1963, the ATBC has over 1200 members from more than 70 nations worldwide.



Dr. William F. Laurance, ATBC president



Welcoming address by Dr. Chen Jin, director of XTBG



Dr. Chen Zhu, CAS vice president, meeting with ATBC council members



Association
for Tropical
Biology and
Conservation

THE KUNMING DECLARATION (21 JULY 2006)

THE CRITICAL NEED FOR FOREST CONSERVATION AND STRATEGIC RESEARCH IN TROPICAL ASIA

WHEREAS, the biological diversity of tropical forests in Asia is among the very richest and most spectacular on the planet, and likely accounts for at least a quarter of all species on Earth; and

WHEREAS, Asia has the highest deforestation rate of any major tropical region in the world, and is also being massively altered by rampant industrial logging, plantation expansion, overhunting, the illegal trade in wildlife and wildlife products, pollution and degradation of freshwater and coastal marine ecosystems, rapid human population growth, and other threats; and

WHEREAS, many species in tropical Asia have naturally restricted geographic ranges and small population sizes, rendering them inherently vulnerable to habitat destruction and degradation; and

WHEREAS, the geographic ranges and population sizes of large forest wildlife, such as elephants, rhinoceroses, tigers, sun bears, and orangutans, have collapsed dramatically in the region, to the degree that very few forests today contain the full complement of their original megafauna; and

WHEREAS, many important ecosystems in tropical Asia are seriously underrepresented within national parks and protected areas, leaving them highly vulnerable to future loss and degradation; and

WHEREAS, spectacular economic growth in Asia, particularly in China and India, is greatly escalating demands for timber, bush meat, wildlife products, agricultural land, and infrastructure expansion throughout the region, and often leads to the destructive or unsustainable use of natural resources; and

WHEREAS, rapid economic growth and the impressive development of scientific expertise in tropical Asia are creating important new opportunities for targeted research and conservation initiatives;

THEREFORE, BE IT RESOLVED that the Association for Tropical Biology and Conservation:

- URGES the nations of tropical Asia to expand the number and size of protected areas within their borders, especially for forest types and eco-regions that are poorly protected in existing reserves, and for the increasingly rare areas that still retain their highly vulnerable megafauna; and
- IMPLORES the nations of tropical Asia to support existing protected areas against illegal hunting, logging, encroachment, and other degrading activities, providing the political will and resources needed to ensure their long-term protection, especially for

- surviving megafauna; and
- STRONGLY SUGGESTS that reserves be linked wherever possible into regional networks and cross-national corridors, to increase their size and effectiveness for area-sensitive wildlife, and to reduce their vulnerability to many external threats; and
- RECOMMENDS that financial support be substantially increased for scientific strategies to (a) restore degraded and secondary forests, (b) identify key regions of high biological and conservation significance, (c) enhance and maintain functional connectivity for wildlife among existing and planned reserves; (d) develop multi-national research, collaboration, and capacity-building; and (e) devise sustainable strategies for natural-resource development; and
- STRONGLY SUGGESTS that policy makers in tropical Asia engage in an active and ongoing dialogue with informed scientists, in order to better understand the critical challenges facing the region and its vital natural resources; and
- URGES the People's Republic of China, by virtue of its growing economic power, considerable scientific expertise, and growing demands on natural resources in the Asia-Pacific Region, to take a leading role in promoting, funding, and developing more sustainable development strategies and conservation initiatives in tropical Asia.

The ATBC

The Association for Tropical Biology and Conservation (www.atbio.org) is the world's largest scientific organization devoted to the study, conservation, and wise use of tropical ecosystems. Founded in 1963, the ATBC has over 1200 members from more than 70 nations worldwide.

The most recent annual meeting of the ATBC was held in Kunming, China, from 18-21 July 2006, hosted by the Xishuangbanna Tropical Botanical Garden and the Chinese Academy of Sciences.

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Training Course on Frugivory and Seed Dispersal

From July 22 – August 5, a training course on advanced techniques in frugivory and seed dispersal was organized by Dr. Richard Corlett (University of Hong Kong) and Dr. Chen Jin (XTBG) in Xishuangbanna and Ailaoshan. The aim of the training course was to provide a broad introduction to methods of studying frugivory and seed dispersal, including field observations and seed traps, radio technology and molecular techniques. The lecturers of the training course were Dr. Chen Jin of XTBG, Dr. Richard Cortett of the University of Hong Kong, Dr. David Westcott and Dr. Denise Hardesty of Australian Commonwealth Scientific and Industrial Research Organization (CSIRO), Dr. Catherine Moran of Australian University of Griffith. They delivered 16 lectures covering

the most recent development progress in the studies on frugivory and seed dispersal. This intensive course required the participants to carry out independent research projects with the emphasis on practical techniques and their application to problems in ecology and conservation management. Under guidance of the instructors, all participants completed their projects successfully. Dispersal of seeds by frugivore is an important ecological process that has attracted increased interest from researchers and conservation managers over the past few decades. The training course brought together 22 students from India, Thailand, Japan, Sri Lanka, Malaysia, Spain, USA and Beijing Institute of Zoology, Yunnan University and XTBG.



Participants of Training Course on Frugivory and Seed Dispersal



Participants of 7th International Fig-fig Wasp Biology Symposium

The 7th International Fig-fig Wasp Biology Symposium

Hosted by XTBG and funded by National Natural Science Foundation of China (NSFC), the symposium was held at XTBG during 24-26 July. 56 participants from 11 countries and regions attended the symposium. Dr. Chen Jin, director of XTBG, delivered a welcome speech. The Symposium, with the theme of “co-evolution and mutual beneficial development”, included 2 invited lectures and 24 special reports. The participants exchanged ideas on the most recent development on fig and fig wasp studies since the year of 2000, discussed new hot spots in fig and fig wasp, the combination of macro and micro studies, planned to enlarge and further cooperation among international peers. In addition to

academic exchanges and discussions, the participants made a field trip to the tropical rainforest in Xishuangbanna. At the end of the symposium, Dr. Jean-Yves Rasplus, executive chairman of the symposium and adjunct professor of XTBG, said that the symposium was well-organized and a successful gathering of large scale.



International Workshop on Forest Canopy Research and Sustainable Use of Forest Canopy Biodiversity in China

Co-sponsored by XTBG and the Global Canopy Programme (GCP) of the University of Oxford, the workshop was held during July 15 and 16 in Harbour Plaza Hotel, Kunming. The workshop is aimed to increase the awareness of Chinese scholars and the public of forest canopy biology and to promote forest canopy research in China. Prof. Chen Jin, director of XTBG, Prof. Guo Huijun, deputy director of Yunnan Provincial Department of Forestry, Mr. Tim Summers, British Consul-General, Chongqing, addressed the meeting. Mr. Andrew Mitchell, director of GCP, gave an overview of international forest canopy research, including its history, status quo, and development trend. Scholars from Britain, Australia, Germany and the Netherlands were invited to the workshop. They introduced the most recent development in forest canopy research and exchanged experience in the sustainable use of forest canopy biodiversity. Domestically, over 60 scholars from XTBG, CAS Institute of Botany, Beijing Forestry University, Yunnan University and Yunnan Agricultural University participated in the workshop. Some of the XTBG scientists made thematic reports at the workshop. The Global Canopy Programme (GCP), British Foreign and Commonwealth Office (FCO), CAS and XTBG provided major support to the workshop. Dr. Cao Min, deputy director of XTBG, is a member of the GCP Steering Committee.



Dr. Andrew Mitchell, director of GCP addressing International Workshop on Forest Canopy Research and Sustainable Use of Forest Canopy Biodiversity in China



Dr. John Pike (left) and Dr. Cao Min (right) demonstrate tree climbing skills

International Workshop on Sustainable Development and Biodiversity Conservation: Consequences of Land-use Policy

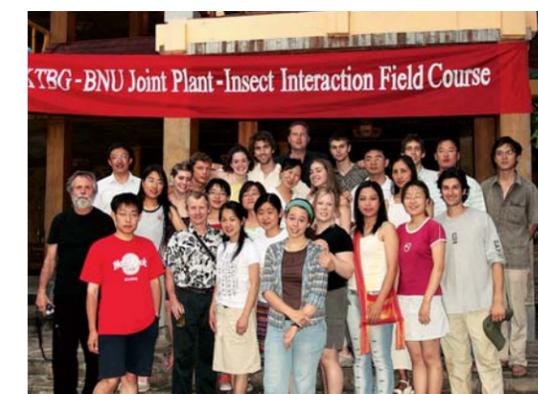
Sponsored by XTBG and jointly funded by NSF (USA) and CAS, the workshop was attended by more than 20 scholars in the fields of ecology, biology, economics, sociology and anthropology. These scholars from China, USA, Canada and Australia attended the workshop during 22-29 July. The participants made general discussions on the consequences of land-use policy on sustainable development and biodiversity conservation. With regard to the development of rubber industry in Xishuangbanna, the participants agreed that the rapid proliferation of rubber plantation brings economic profits and employment opportunities to the local people. However, they doubted about the sustainability of the growth. The workshop was coordinated by Dr. Zou Xiaoming, a team leader of Soil Ecology Lab., XTBG.



Participants of International Workshop on Sustainable Development and Biodiversity Conservation: Consequences of Land-use Policy

International Workshop on Plant Reproductive Biology

The International Workshop on Plant Reproductive Biology, co-sponsored by XTBG and the College of Life Sciences of Beijing Normal University (BNU), was held in Beijing and Yunnan from May 2 to 20. UT-XTBG-BNU joint Plant-Insect Interaction Field Course was carried out in XTBG. Four internationally renowned professors, Dr. Spencer C. H. Barrett from University of Toronto, Dr. Lawrence Harder from University of Calgary, Dr. Christopher Eckert from Queen's University, and Dr. John Pannell from Oxford University, were invited to the course. When in Beijing, over 50 participants from various research institutes and universities took part in the workshop and field study. The four professors delivered a series of lectures, which covered the new advances and their research theories. A total of 12 students from UT, 6 from BNU and 6 from XTBG participated in the UT-XTBG-BNU joint Plant-Insect Interaction Field Course held in XTBG. During their study in XTBG, Dr. Spencer Barrett and Dr. Christopher Darling of Royal Ontario Museum delivered 7 lectures. Dr. Chen Jin, director of XTBG, met with the four professors and participating students.



Participants of International Workshop on Plant Reproductive Biology



Workshop on Long-term Ecological Research

XTBG held a workshop on Long-term Ecological Research in Kunming. The 30 participants were XTBG scientific personnel engaged in forest ecological research and field stations (Xishuangbanna, Ailaoshan, and Yuanjiang stations). A total of 14 oral presentations were delivered. The topics include the status of long-term ecological research both home and abroad, the construction of field stations, effective utilization of data collected from field stations, soil ecological process, forest hydrological effects, soil seed bank, forest dynamics.



Participants of Workshop on Long-term Ecological Research

Other Workshops

At the invitation of Leisure and Cultural Services Department, Hong Kong Special Administrative Region, Dr. Chen Jin, delivered a lecture on *“World Movement on Biodiversity Conservation: Review and Prospect”* in March.

At the invitation of Kadoorie Farm and Botanic Garden, Hong Kong, Dr. Zhu Hua delivered a lecture entitled *“Characteristic of Karst Ecosystem and Biodiversity in South China”* in HK during 19-24 March.

Sino-Myanmar Seminar on Opium/poppy Control Alternative Development was held

at XTBG in July. Participants from Chinese Ministry of Public Security and Myanmar Interior Ministry attended the seminar. XTBG has contributed to opium/poppy control alternative planting and rural development in northern Laos since 1998.

In August 2, 15 ecologists from Japan Forest Management and Research Network attended the Sino-Japanese Seminar on Forest Ecology held at XTBG, in order to enhance exchanges and cooperation between Yunnan and Japan.

Five ecologists of XTBG attended the LTER All Scientists Meeting 2006 in USA during September 20-23, aimed at communicating and exchanging with world ecologists for long-term ecological research.



Dr. Chen Jin (right) delivering a lecture in HK public libraries during Hongkong Flower Show 2006



HORTICULTURE



HORTICULTURE

XTBG contains 12,689 species of plants in 34 living collections, including trees and plants of great cultural or medicinal value. Many of these plants are irreplaceable and endangered in the wild.

Species Enrichment Project

(Ten-thousand Plant Species Project)

The project "Tropical Plant Resource Conservation and Its Sustainable Use" (hereafter "Species Enrichment Project" for short) conducted by XTBG had been awarded the first prize for Science & Technology Progress in 2005 in Yunnan Province.

XTBG has devoted itself to conserving plant diversity, especially the rare and endangered plants in Southwest China since 1959. However, the number of collected plant species was only about 4,000 in the garden by the year 1999. With the deterioration of the ecological environment and the disappearance of biological diversity, the Chinese Academy of Sciences and Yunnan Provincial government jointly launched the Species Enrichment Project from 2000 to 2004, which focused on the conservation of rare and endangered plants, endemic plant species, flagship and keystone species, plant species with high scientific value and potential economic value such as wild relatives of cultivated crops, fruits, and medicinal plants. Now with 12,689 plant species conserved in 34 living collections. A total of 4,294 species of them are plants of potential economic values, 791 species are rare and endangered plants that have been listed in the China Plant Red Data Book. Some living collections are very important to plant conservation and research. For example, over 400 palm species have been collected and cultivated in the palm collection. In the aroid collection, 24 genera and 141 species have been collected since its establishment in 2001, which account for 54% of the total species in China and 77% of those in Xishuangbanna. XTBG currently holds the largest wild aroids collection in China. The first *Dracaena* collection in China was also set up in XTBG,

in the 1.06 ha. area, 34 species (varieties) have been preserved. The implementation of the Project had greatly contributed to the sustainable development of XTBG and the social economic development of the local areas as well.



Species Enrichment Project awarded the first prize for Science & Technology Progress by Yunnan Province

New Western Parkway Entrance

One priority of the master plan, created with the help of Prof. Sun Xiaoxiang and Chongqing Municipal Design and Research Institute (MDRIC), is to design a new western parkway entrance, which will improve visitor access, enhance the visibility of the Garden, and forge stronger connections with the surrounding communities. In the past year, XTBG continued construction of the new Luosuo River Bridge and the Tropical Flowers Garden.



The new Luosuo River Bridge

MDRIC was selected as the architectural design firm. The architects conducted a careful site analysis and reviewed construction concepts with XTBG. Constructed by Yunnan Highway and Bridge Construction Co. Ltd., the new 398-meter length bridge was completed in August 2006. Construction of the new bridge was jointly funded by CAS and XTBG.

In the new Tropical Flowers Garden, some palms and bamboos were placed into relevant collections to lend further dimension to the plantings there. More than 500 species and 40,000 plant individuals were propagated and grew for display in the new Tropical Flowers Garden, including *Pseudocalymma alliaceum*,

Acalypha wilkesiana, *Passiflora coccinea*, *Pyrostegia venusta*. A significant number of plant species and varieties were planted in the Garden, including 26 varieties of *Ixora*, 50 varieties of *Hibiscus*, 5 varieties of *Allamanda*, 6 varieties of *Plumeria*, 7 varieties of *Mussaenda*, 4,000 individuals of *Bambusa*, 200 individuals of *Bougainvillea*. Other elements, including civil engineering, will be completed before April 2007. Construction of four new gardens, including the new Tropical Flowers Garden, had passed the environmental effect assessment conducted by Environmental Protection Department of Xishuangbanna Prefecture in September.



A birdview of the planned Tropical Flower Garden



Collections & Nursery

In the Agroforestry Exhibition Area, a new irrigation system was installed, 995 new plants of 4 species were added and 2,051 plants of 13 species were reported.

The Medicinal Plants Collection underwent a significant upgrade, as 30 middle-size mounds were created for traditional ethnic prescription planting. In Shaded Plants Collection, new plants were added and some beds underwent considerable expansion. A total of 155 Ananas species were displayed in this Collection.

In the *ex situ* Conservation Area and Agroforestry Exhibition Area, inventories of all rare and endangered or national protected plants were taken, historical and basic information of those plants were documented.

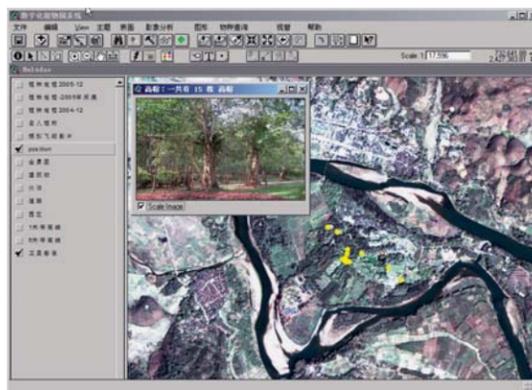
In the Nursery, gardeners propagated and grew more than 11,000 individuals of 954 plants introduced from domestic and abroad. The survival rate is 85%. The Nursery staff produced 1,530 plants for displays in beds and containers across the Garden.

Phenological Observation

Growth and flowering phenological information of 1,937 plants were monitored and documented once weekly. More than 4,660 plants were observed and documented annual growth phenological information.

Data management

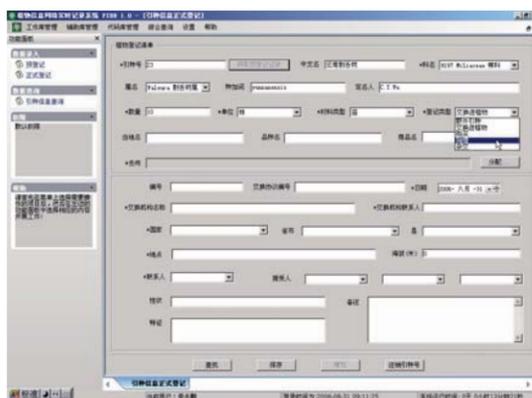
Over 4,750 plants are labeled with metallic barcode in 13 collections. Global Positioning System is used to locate the positions of individual plants. Information for 8,183 individual plants in 24 collections was recorded on the Database of Digital Garden System. Over 640 new species transplanted from the Nursery to planting in 13 collections are tracked and recorded; 700 new specimens were mounted and attached with digital photos.



Digital botanical garden



Barcode label



Database interface





Educational exhibition in Jinghong city

Xishuangbanna

During the Spring Festival to April, close to 388,000 visitors flocked to XTBG's Tropical Rainforest and Ethnic Culture Museum and enjoyed the *Exhibition on Ethnic Papermaking Technology in Yunnan*. XTBG offered a thorough description of ethnic papermaking technology in different ethnic groups of Bai, Naxi, Miao, Dai, Yi and Chinese Han – including paper stocks, tools, technology, and usage. XTBG also displayed a number of demonstrations: Luoping bark paper, Dai's stencil tissue paper, Lufeng Yi's bamboo paper, Lijiang Naxi's Dongba paper and paper from other countries.

During the National Science and Technology Week from May 20 to 26, XTBG offered a series of public education activities to the general public. Mr. Zhu Hongxiang delivered a lecture entitled "*Tropical rainforest – the origin of Xishuangbanna ethnic cultures*" to the audiences on May 20. In addition to opening its door to the public, XTBG also held an exhibition entitled "*The Mystery of Xishuangbanna tropical rainforest*" in Jinghong and Mengla. Over 20,000 visitors had visited this exhibition.

As an important power for public education, XTBG organized an exhibition of "*Rare and Endangered Plants*" at the Tropical Rainforest Ethnic Culture Museum within the Garden during the National Day Festival. XTBG exhibited 10 panels with vivid pictures of rare and endangered plant species, the significance of plant conservation, in order to increase the public awareness of the interactions between plant resources and human beings.

The opening ceremony for the Tea Culture Museum of Six Ancient Tea Mountains was held on October 30 at Yiwu, Yunnan. Dr. Chen Jin and Prof. Xu Zaifu attended the ceremony on invitation.

The general information of XTBG, in the background of numerous rare tropical flowers and unique plant collections, was live-broadcasted on Megaconference VIII on 3 November.

A five-day field training course was conducted for 30 students from School of Life Sciences, University of Science and Technology of China in August.

Beijing

During April 8 to May 8, the educational exhibition themed "*Xishuangbanna: the Natural Beauty and Wonderland*" in Beijing attracted more than 100,000 visitors. A total of 122 panels, 106 animal specimens, 18 plant specimens were displayed. Visitors also enjoyed a presentation entitled *Tropical Rainforest and Biodiversity Conservation* delivered by Dr. Zhu Hua of XTBG.

The exhibition was jointly sponsored by XTBG, Government of Xishuangbanna Dai Autonomous Prefecture (XDAP) and China Science and Technology Museum (CSTM). During the exhibition, CSTM provided its Astrovision Theater and Children's Science Paradise for the exhibition free of charge. XDAP held the exhibition *Wonderful Xishuangbanna* and XTBG responded for the educational exhibition *Riddle of Tropical Rainforest in Xishuangbanna*.

Mr. Tomur Dawamat, vice chairman of the 9th NPC Standing Committee, was invited to the opening ceremony. Attending the opening ceremony were also Xu Shanyan, vice president of the China Association of Science and Technology (CAST), Dr. Chen Jin, director of XTBG, Huang Shan, vice sheriff of XDAP, Wang Yuzhou, director of CSTM, and relevant leaders from CAS, CAST, China National Tourism Administration, China Research Institute on Science Popularization. The opening ceremony was presided over by Prof. Wang Yuzhou, director of CSTM. As representatives of XTBG and XDAP, Dr. Chen Jin and Huang Shan addressed the opening ceremony. About 20 media agencies covered the exhibition on the opening day. All the participants spoke highly of the performances and the arrangement of the exhibition.

CAS president Lu Yongxiang, who is also the vice chairman of the 10th NPC Standing Committee, and CAS vice president Chen Zhu sent a letter of congratulation respectively extending warm congratulations to the opening of the exhibition.

The exhibition is an integration of research,

science popularization, culture and tourism, which helps not only to present Xishuangbanna and spread the knowledge of tropical rainforest but to boost the social and economic development of Xishuangbanna.



Opening ceremony of the exhibition in Beijing



Xu Shanyan (left 2), vice chairman of China Association of Science and Technology visited the exhibition.



Shanghai

The *Xishuangbanna Tropical Rainforest Science Popularization Week*, which opened at Shanghai Science & Technology Museum (SSTM) on September 28. The 10-day science popularization week focused on the mysterious tropical rainforest and unique ethnic cultures in Xishuangbanna. XTBG displayed 17 panels, 23 animal specimens, 36 plant specimens, and costumes of the 6 main ethnic groups in Xishuangbanna at SSTM. The exhibits were mainly provided by Xishuangbanna Tropical Rainforest Ethnic Culture Museum of XTBG and the Natural Museum of Xishuangbanna Nature Reserve. Dr. Li Qingjun delivered a lecture on Pollination Biology and Plant-animal Co-evolution. Audiences from Fudan University, SSTM and some senior high schools joined this presentation.



Opening ceremony



Lecture by Dr. Li Qingjun in Shanghai Science & Technology Museum

Kunming

XTBG participated in the Kunming International Flower Show with an interactive display. More than 35,000 visitors enjoyed this display during September 7-10. XTBG displayed 33 species of wild flower plants in a Dai-style folk house made from beautiful green stripe bamboo, *Bambusa vulgaris*, an endemic species in Xishuangbanna. Visitors were encouraged to pick up a brochure to guide them through the exhibits, learning along the way about the many fascinating uses of plants in different cultures, structure and color of flower, flower plant taxonomic knowledge. Many media agencies in Kunming including YNTV, KMTV covered this exhibition.

Hongkong

At the invitation of Hong Kong Kadoorie Farm & Botanic Garden (KFBG), 7 XTBG staff paid public education tours to Hong Kong in the year. They discussed plans for further and deeper cooperation and had primarily agreed to co-sponsor the exhibition of “*The Mystery of Xishuangbanna Tropical Rainforest*” at KFBG in April 2007. On their way back from Hong Kong, the XTBG delegation also visited Shenzhen Botanical Garden and South China Botanical Garden. They made exchanges and communications with the two gardens on public education and landscape design.



Dr. Chen Jin meeting with KFBG delegation

Europe

XTBG presented one paper titled *Public education in the Xishuangbanna Tropical Botanical Garden (XTBG), China*, with particular respect to methodological contents at the BGCI's 6th International Congress on Education in Botanic Gardens in August in London.

Dr. Chen Jin, director, Mr. Li Hongwei, deputy director, and assoc. Prof. Zhu Hongxiang, head of Public Education Team of XTBG, attended the Sino-European Workshop on Natural History Museums and Ecological Sustainability in Frankfurt, Germany from November 23-26, 2006. Dr. Chen delivered a presentation on public education and “Tropical Rainforest Ethnic Culture Museum” in XTBG.



PARTNERSHIP

Work report to Yunnan Provincial Government

On April 19, Liu Ping, vice governor of Yunnan province, presided over a meeting to hear a report on the master plan and its phased implementation plan and infrastructure construction of XTBG in the following two years in the administrative building of Yunnan Provincial Government, Kunming. Dr. Chen Jin, director of XTBG, delivered the work report. After listening to the report, Liu said that XTBG's master site plan is in accordance with the reality of XTBG, the need of accelerating tourism industry in Xishuangbanna and the sustainable development of XTBG. Fully acknowledging the historic contributions and the status quo of XTBG, Liu said that the government will actively support XTBG. Dao Linyin, governor of Xishuangbanna prefecture, also expressed that the prefectural government will provide continual support to XTBG. Leaders from Yunnan Provincial Development & Reform Commission, Departments of Science

& Technology, Finance, Land & Resources, Tourism Administration, and Provincial Tourism Investment Company, CAS Kunming Branch also presented at the meeting. The participants put forward many valuable suggestions for the tourism infrastructure construction and sustainable development of XTBG.

On October 20, Yunnan Provincial Government held an on-the-spot meeting for Xishuangbanna tourism in Jinghong. The second-phase tourism construction project of XTBG has been placed in the list of priority projects and will be actively supported. The project construction headquarter office has been founded, led by XTBG and Government of Xishuangbanna Prefecture. The headquarter office is responsible for commanding and coordinating the construction of second-phase tourism of XTBG.



Dr. Chen Jin presenting master site plan to Yunnan Provincial Government

XTBG-locality S&T Cooperation

XTBG launched 4 new projects to provide S&T support to reduce poverty in Mengla County, Yunnan Province. Working closely with local government, XTBG provides a lot of support to the rural development of Mengla County, especially to its biological industry. The Garden provided employment opportunities, as well as help farmers get better access to such services as technological support, financing and training in order to increase their income.

On the 7th of January, an agreement on project of international tourism development & planning in Menglun township was signed among XTBG, Government of Mengla County, Yunnan Province, and Yunnan Tourism Investment Co. Ltd.

On February 8, Dao Linyin, governor of Xishuangbanna Dai Autonomous Prefecture, led a 20-people delegation visited XTBG, in order to discuss the relevant details on the planning of the enlargement and tourism of the Garden. Dao disposed the concrete work procedures to support the development of XTBG.

A delegation of Beijing Institute of Technology (BIT) visited XTBG on 14 February. BIT would carry out comprehensive cooperation with XTBG in biomedicine and student training program.

XTBG held a seminar on cooperation and exchange between XTBG and Xishuangbanna National Nature Reserve on 13 December.

Jiang Pusheng, the CPC secretary of Xishuangbanna Dai Autonomous Prefecture, led an official delegation to XTBG during 15-16 September. The delegation investigated the construction of tourism facilities in the second phase and were briefed on bio-energy research.



Signatory ceremony of international tourism development & planning in Menglun township



Dao Linying, governor of Xishuangbanna prefecture, meeting with XTBG scientists



Collaborative relationship between XTBG and XNNR enhanced



Graduation ceremony 2006

TEAM BUILDING AND TALENT TRAINING

XTBG has been paying great attention to the graduate education, introduction and training of scientific personnel since its establishment.

Graduate Education

Ph.D. degree in Botany

XTBG has been authorized to confer Ph.D. degree in Botany by the Academic Degree Evaluation Committee of the Graduate School of the Chinese Academy of Sciences in the year 2006. XTBG will start recruiting doctoral candidates in botanical sciences from the year of 2007. Since 2001, XTBG has been authorized to confer Ph.D. degree in Ecology.

XTBG has been recruiting M.Sc. students in Ecology since 1986. In 2000, XTBG obtained permissions to enroll M.Sc. students in Botany.

Currently, XTBG has 29 supervisors, 12 of

them are Ph.D. supervisors. In 2006, XTBG has accepted 38 M.Sc. students and 18 Ph.D. students. At present, there are 171 graduated students in XTBG. Four of them are international students from Thailand, Viet Nam and Egypt. In 2006, three M.Sc. students are honored with the outstanding prize for President Award of Chinese Academy of Sciences, grand II for Diao Award and the outstanding prize for Liu Yonglin Award respectively.

In 2006, a total of 30 graduates were conferred with M.Sc. and Ph.D. degrees. The graduates and their supervisors planted seedlings of *Pometia tomentosa* for ceremony in front of the apartment building at XTBG.

The training course for Graduate Supervisors was jointly held by Kunming Branch and Xi'an Branch of CAS in XTBG during 25-27 October. A total of 51 participants from CAS Graduate School and institutes attended the training course.

The Seminar on Graduate Admissions of Yunnan 2007 was held in XTBG on November 7, 2006. Over 50 participants from various graduate schools in Yunnan province attended the seminar.

Team Building

Dr. W. John Kress honored with the Colorful Yunnan Friendship Award



An annual award for foreign experts who have made remarkable contributions to the social and economic development of Yunnan province was announced at the Kunming Expo Garden Hotel, with 10 foreign experts selected as the winners this year.

Dr. W. John Kress, an adjunct professor of XTBG, was among the 10 award winners. Dr. Li Qingjun received the award on behalf of Dr. Kress since Dr. Kress was unable to attend the award ceremony in person. The Colorful Yunnan Friendship Award for Foreign Experts is conferred to foreign experts in appreciation of their contributions to Yunnan's social development and economic, scientific, technological, educational and cultural construction. The winners are experts engaged in various fields involving agriculture, mechanical industry, electronic industry, education, scientific research, medicine, tourism, and publishing, etc. Dr. Kress was invited as XTBG adjunct professor in 2003. He has carried out collaborative research with XTBG scientists since 1995. Academic papers from these collaborations have been published in international journals such as *Nature*, *Systematic Botany*, *American Journal of Botany*. He also helped XTBG win the bid to host ATBC 2006.

In 2006, two more professors from America and India were invited as adjunct professors. They are Prof. David Ward Roubik from Smithsonian Tropical Research Institute, USA and Prof. Ravinder. K. Kohli from Panjab University, India.

First two foreign postdoctors passed their postdoctoral research appraisals in XTBG

Entering the postdoctoral program of XTBG in September 2004, Dr. Aeshita Mukherjee from Saurashtra University in India and Dr. Burkhard Wilske from Max Planck Institute for Chemistry in Germany had conducted their research into plant-animal interactions and plant ecophysiology respectively.

Under the supervision of Prof. Chen Jin, Dr. Mukherjee recorded occurrence and morphometric over one and a half years for two species of frugivorous bats, *Cynopterus sphinx* and *Rousettus leschenaulti*, from six localities in and around tropical rainforest in Xishuangbanna, SW China. They also investigated the effect of bat feeding behavior on the seed germination of 20 plant species and compared characteristics of germination for different treatments. Related articles were submitted to *Acta Chiroptologica* and *Journal of Tropical Ecology*.

The study on "Functions of volatile organic compound (VOC) emissions in stress tolerance of tropical plants in Xishuangbanna, southern Yunnan, China" aimed to better understand phytochemical emissions from the natural rainforest ecosystems in SE Asia. Under the supervision of Dr. Cao Kunfang, Dr. Wilske investigated VOC emission strength and pattern of 12 tropical tree species of Xishuangbanna using dynamic Teflon bag enclosures. Isoprenoid emission potentials of 4 species were considerably deviating from a previous report. Species that were investigated twice a year showed seasonal difference in emission rates and composition. Total isoprenoid emissions were generally higher with new leaf flush than with aged leaves. He also tested potential effects of VOC species on stress tolerance.

On November 18, Dr. Mukherjee and Dr. Wilske passed the evaluation of their postdoctoral research reports.

XTBG has been authorized as a workstation for postdoctoral research on biology by



the Ministry of Personnel, and the National Post-doctorate Management Committee of China since 2003. Each year, XTBG enrolls postdoctoral researchers from domestic and abroad.

With an objective of recruiting overseas professionals, XTBG held a recruitment interview on September 9. The three candidates were Dr. Charles H. Cannon Jr. and Dr. Zhang Yaoqi from the United States, and Dr. Mihai Serban Proches from Romania.

Dr. Liu Wenyao and Dr. Song Songquan passed their end-of-term evaluation "100 Talents Program" in June.



Emeritus professorship awarded to Prof. Xu Zaifu (left) by Dr. Chen Zhu (right), CAS vice president

To comment his outstanding contributions to development of XTBG, CAS vice president Dr. Chen Zhu awarded Emeritus Professorship to Prof. Xu Zaifu, former director of XTBG on 19 March. As the 85th anniversary of the founding of the Chinese Communist Party, Xu Rongkai, Yunnan Provincial Governor, paid a special visit to Prof. Xu.

Prof. Liu Hongmao, former director of XTBG and vice president of CAS Kunming Branch, died of illness on May 2 in Kunming at the age of 45. His farewell ceremony was held at Youguanqiao Funeral Home on May 5. About 300 friends and family attended the farewell ceremony to pay their last respects to Prof. Liu.

Talent Training

21 people participated in various training courses sponsored by domestic or abroad organizations.

Personnel Training Base for Tropical Horticulture

In cooperation with Simao Normal College, a personnel training base for tropical horticulture has been established in XTBG since 2001. A total of 93 college students improved their knowledge on tropical horticulture and technique in the year 2006.

Training Course on Gardening and Horticulture

The 2006 Training Course on Gardening and Horticulture ended on August 30. The 26-day curriculum consisted of lectures, field practice, demonstration, study tours, discussion and final test. A certificate was awarded to each participant upon his or her successful completion of the curriculum. In 2006, 95 participants from Xishuangbanna prefecture and Simao prefecture accomplished the training. The Department of Labor and Social Security of Yunnan Province designated XTBG as the No. 68 Institute of Yunnan Provincial Professional and Technical Ability Appraisal on Horticulture in 1997. Since then, XTBG has hosted training course on gardening and horticulture each year, making full use of its advantages in landscape planning and designing, horticultural cultivation, seed storage, plant protection, forest science. Currently, more than 600 technicians have been assessed by XTBG.

Communist Youth League of XTBG was honored Five-four Red Flag CYL by CAS CYL in May. Three young students and staff of XTBG received Excellent Award 2004/05 from CAS CYL in June. They are Mr. Hu Yaohua for Excellent CYL Cadre Award, Mr. Yin Jiantao and Mr. Zhu Zhi for Excellent CYL Member Award respectively.

XTBG Sports Meeting 2006 received complete success during 10-15 November. Although it is an honor to get the champion, happiness derived from the competitions is much more valuable. Friendship goes first, while competition goes second.



VISITS

CAS President Lu Yongxiang inspected XTBG

On August 11, CAS president Lu Yongxiang, who is also vice chairman of the Standing Committee of China's top legislature NPC, made his 4th inspection visit to XTBG.

President Lu visited the living plant collections, the new Tropical Flower Garden under construction, the new Luosuo River Bridge, the cultivation base of *Jatropha curcas*. He also checked out the digital botanical garden. He listened to a review report on XTBG development during the second-phase of Knowledge Innovation Program and its planning for the third phase, and also held talks with researchers.

President Lu said that great changes have taken place in XTBG since its accession to the Knowledge Innovation Program and the implementation of the Species Enrichment Project. He stressed on the importance of XTBG's progressive research teams and its innovative culture. Inspiring progress has been made in germplasm conservation, horticulture and gardening, research publications and achievements, international cooperation and R&D on resource plants. He is confident with the future development of XTBG. President Lu urged the scientists and administrators of XTBG to make careful studies on research priorities and strategies for the future development, especially for building a leading botanical garden in the world. He also encouraged the scientists here to make innovative contributions to the local development in light of national strategic demands and international scientific development.



President Lu suggested more research work in the field of composition, structure and optimization of conserved plant species, increase and enhance the benefit of plant species conservation and utilization, wide and systematic research on resource plants.

Visits of Vice Presidents of CAS

In 2006, two CAS vice presidents, Dr. Cao Jianlin and Dr. Chen Zhu inspected XTBG. They urged XTBG to incorporate high technologies as support to the basic research of plant science, since the future development requires more collaborative and interdisciplinary studies. XTBG should also vigorously promote the construction of the Garden, and in an effort to play the role of backbone and guidance in the science innovation and biodiversity conservation.



The 4th visits of Lu Yongxiang (right 4 in first row), CAS president, to XTBG

Other Visitors

February

- February 7-21 Visit by Dr. Janet Sturgeon, Simon Fraser University, Canada.
- February 14 Visit by delegation of Sichuan Provincial Government to make field research on tourism.
- February 23-25 Visit by three CAS academicians of biological and medicinal sciences (Prof. Lin Qishui, Prof. Qiang Boqin, and Prof. Chen Weifeng).
- February 27 Visit by National Development and Reform Commission, headed by Mr. Ma Zuiliang, to inspect the implementation of national key projects conducted by XTBG.

March

- March 14-18 Visit by 22 participants of Regional Farmer Workshop on the Potential and Future of Traditional Farming Systems with Special Emphasis on Swidden Agriculture in MMSEA.
- March 20-25 Visit by 3-people delegation from Ministry of Environment, Cambodia, led by Ms. Ouk Seiha, deputy director of Department of Conservation and Protection.
- March 25-26 Visit by a 3-people delegation from P. L. Design Co, Ltd., Thailand, led by Dr. Weerapan Paisarnnan, chairperson of the board.
- March 30 Visit by 30 participants of the Orchid Conservation Workshop.
- March 31-April 7 Visit by Dr. William Chang, director of National Science Foundation (NSF) Beijing Office.

April

- April 4-27 Visit by Ms. Luxsana Summariniti and Ms. Daranee Danwandee, Department of Landscape and Environmental Conservation, Maejo University, Thailand.
- April 5-26 Visit by Prof. Markku Hakkinen, world-known specialist in *Musa*, of Helsinki University Botanical Garden, Finland.
- April 8-10 Visit by Prof. Marc van Montagu, president of the European



Federation of Biotechnology and Prof. Lars Bolund of University of Aarhus, Denmark.

April 12-14 Visit by Dr. Yali F. Hallock, program director of Grants & Contracts Operations Branch, Division of Cancer Treatment and Diagnosis, National Cancer Institute and Dr. Zhang Hongjie from College of Pharmacy, University of Illinois at Chicago, USA.

April 16 Visit by Mr. Xie Zhenghua, member of the 16th Central Committee of CPC and former director of the State Environmental Protection Administration, Mr. Lu Huangsheng, chairperson of State-owned Major Enterprises Supervision Committee, Commission of the State Council, and Prof. Hua Sheng, president of Yanjing Overseas Chinese University.

April 16- May 12 Visit by Dr. Jean-Yves Rasplus, XTBG adjunct professor and world-known specialist in fig wasp ecology and evolution, of National Institute for Agricultural Research, France.

May

May 6 Visit by Mr. Luo Mingyi, director general of Yunnan Provincial Tourism Bureau.

May 18 Visit by Prof. Bai Jiayu, scientist-in-chief of Chinese Academy of Forestry.

May 19 Visit by a 17-people delegation from Maejo University, Thailand, headed by the vice president assoc. Prof. Arkmon Kanjanaphachot.

May 27-31 Visit by Dr. Hasan Moinuddin, consultant of Asian Development Bank.

May 31 Visit by Mr. Ding Eryou, deputy director of General Office, Chinese Academy of Sciences.

June

June 8 Visit by Mr. Wang Yu, deputy director of Tibet Science & Technology Department.

June 15-18 Visit by Mr. Wang Tingda, head of Disciplinary Inspection Team designated to CAS by Central Committee of CPC.

June 16-25 Visit by Dr. Heike Vibrans, Laboratory of Ethnobotany at Postgraduate College in Agricultural Sciences, Mexico.

July

July 21-23 Visit by Prof. Ravinder K. Kohli, Panjab University, India.

July 22-25 Visit by Prof. John Grace, director of Institute of Atmospheric and Environmental Science, University of Edinburgh, the United Kingdom.

July 22-25 Visit by Dr. Stuart Davies, director of Center for Tropical Forest Science, Smithsonian Tropical Research Institute, USA.

July 22 Visit by 28 participants of the annual meeting of the Association for Tropical Biology and Conservation.

July 28-29 Visit by assoc. Prof. Dr. Zhang Donglin, University of Maine, USA.

August

August 14-17 Visit by Dr. Barbara Frei Haller, pharmacist and ethnobotanist of the University of Neuchâtel, Switzerland.

August 20 Visit by Mr. Bai Chengliang, director general of Yunnan Provincial Department of Forestry with special reference to bio-diesel research.

August 21 Visit by Prof. Michael Heinrich, University of London, UK.

August 21 Visit by Mr. Li Jiheng, deputy secretary of Yunnan Provincial Committee of CPC.

August 27 Visit by Mr. Teng Mianzhen, director general of Department of Basic Research, Ministry of Science & Technology.

August 27-30 Visit by Prof. Peter K. Endress and Prof. Mary E. Endress, University of Zürich, Switzerland.

August 31 Visit by Prof. Carol Baskin and Prof. Jerry Baskin, University of Kentucky, USA.

September

September 9-11 Visit by 4-delegation from Kyoto University, Japan, led by Prof. K. Yonemori.

September 12-14 Visit by Ms. Shen Yu, director assistant of National Science Foundation (NSF) Beijing Office.

October

October 18 Visit by 6-people delegation from National Office of Clean Energy Action with special reference to bio-diesel research.

October 27 Visit by 10 academicians of Chinese Academy of Sciences and Chinese Academy of Engineering. The academicians are CAS members Bai Yilong, Wang Xiji, Zhou Jun, Huang Runqian, Sun Handong, and CAE members Hu Yongkang, Su Junhong, Chen Jing, Dai Yongnian, Ma Hongqi.

October 29-31 Visit by 12-people delegation from Guangzhou Branch (GZB), CAS, led by Prof. Chen Yong, president of GZB and director of South China Botanical Garden, CAS.

November

November 18-21 Visit by Dr. Zhang Shaowu, The Australian National University, Australia.

November 23 Visit by a 4-people delegation from China Petroleum and Petrochemical Engineering Institute and British Petroleum Company with special reference to bioenergy research.

November 23 Visit by a 5-people delegation from International Department, Central Committee of CPC, led by Mr. Wang Jiarui, Minister of IDPCPC.

November 25 Visit by Mr. Bai Lichen, vice chairperson of National Committee of the Chinese People's Political Consultative Conference.

November 26-27 Visit by Dr. Julia Schmitt, University of Hohenheim, Germany.

December

December 3-4 Visit by a 9-people delegation from University of Western Australia, Australia, led by Dr. Gary Sigley.

December 28 Visit by Mr. Li Yunkun, director general of Afforestation Department, State Forestry Administration of China to make investigation on tropical rare plant species and bio-diesel plants.

December 26 Visit by Mr. Zhu Daoben, vice chairperson of National Nature Sciences Foundation of China to make investigation on Capability Enhance

Project of National Basic Science Talent Training Fund.



FINANCIAL REVIEW

Income and Expenditure (Million Yuan)

Categories	FY 2005	FY 2006	Increase / (Decrease)	
	Million	Million	Million	% Change
Income				
Government Grants	9.854	10.494	0.640	6%
Infrastructure	36.000	4.000	32.000	-89%
Admissions & Services	22.734	27.993	5.259	23%
Grants for Research	18.466	20.201	1.735	9%
Miscellaneous	0.408	0.696	0.288	71%
Sum	87.462	63.384	-24.078	-28%
Expenditure				
Staff Costs	24.726	33.650	8.924	36%
Maintenance	4.645	2.080	-2.565	-55%
General and Admin. Expenses	3.752	6.647	2.895	77%
Infrastructure	11.000	7.740	-3.26	-30%
Equipment	4.692	4.396	-0.296	-6%
Research & Horticulture	13.279	17.817	4.538	34%
Miscellaneous	1.206	1.002	-0.204	-17%
Sum	63.3	73.332	10.032	16%

PERFORMANCE TARGETS AND RESULTS

Comparisons of Performance Indicators

Indices	Outcome	Target	Outcome	±% vs	±% vs	Target
	2005	2006	2006	Last year	Target	2007
Total access to the behind-the-scenes collections	-	3,000	-	-	-	3,000
Total visits to the XTBG website (page views)	291,724	600,000	410,728	+41%	-32%	700,000
Total research publications and compilations	143	200	160	+12%	-20%	200
Articles on high IF Journals	5	5	7	+40%	+40%	6
Total species use, species conservation assessments and species conservation plans supported	-	100	-	-	-	100
Total habitat conservation assessments supported through contributions of information or advice	-	2	2	0	-	3
New technique, new varieties, invention patents of independent intellectual property	-	3	5	-	+66%	3
Benefit of technology transfer (Yuan)	-	500,000	240,000	-	-52%	500,000
Total visits to the garden	534,397	470,000	658,003	+23%	+40%	500,000
Total income (Yuan)	87,462,000	70,000,000	63,384,000	-28%	-9%	80,000,000



PUBLICATIONS

The following graph compares the numbers and times cited of papers published in ISI source journals by groups of XTBG researchers in the past years since 1997.

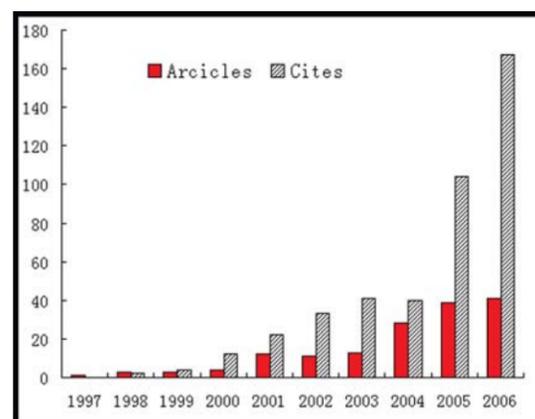


Figure 3 Articles published and cited by year (Source: ISI web of knowledge)

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