BGO NEWSLETTER

THE BOTANICAL GARDEN ORGANIZATION

Ministry of Natural Resources and Environment

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Director's Message

Since the establishment in 1993, Queen Sirikit Botanic Garden has grown up strongly to be a centre of excellent for tropical plants study and research. The garden is becoming a showcase for Thai plants, youth education, and in particular the field of public awareness and conservation.

The Thai plants exhibited within the garden were gathered from throughout the country and their number has increased rapidly, during the past decade we now have an amount up to almost 4,000 species. All collections are correctly identified with tagged, enumerated and database computerized.

One measure of success of the garden is the number of tourists who visited the garden. The number of visitors in 2004-2005 is approximately 250,000 individuals and proudly about 100,000 visitors are schoolboys and girls.

The reputation of the garden is becoming well-known to the public; therefore, the garden has developed into many varied events and many activities in various fields. The garden is still kept in mind as a place to support many botanical activities concerning the rapid changes of our forested areas as a global concern.

Weerachai Nanakorn

Weerachai Nanakorn, Ph. D.

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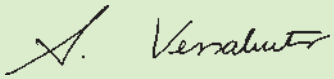
Editorial

Welcome to the 14th issue of the BGO Newsletter. In this issue, besides the general news and activities of the organization, we are pleased to report on the launch of the TIGER Project at QSBG (see page 6).

Also, it is a pleasure to present an article by Dr. Kurzweil, Senior Scientist of the Singapore Botanic Garden, entitled " The Orchid Genus *Disperis* in Thailand" .

During the 2006 fiscal year, the Garden staff participated in some international events. The articles they presented could be of general interest so we have included two of them in this publication.

We hope that you will find the contents of this newsletter useful and appreciate receiving news contributions by our readers.



Suyanee Vessabutr, Ph.D.

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BGO News

Change in the Executive Board Members

The outgoing members are Khunying Suchada Sripen, Mr. Sompote Nuntapong, Mr. Pansook Sripolcharoen, and Mrs. Ornanong Maneekarn; after 2 year-serving in the BGO Executive Board Committee. The BGO staff would like to express their sincere gratitude to them for their commitment and contribution.

We wish to welcome the new members of the Executive Board, namely, Lt.Gen. Aurachun Pibulnakarintr, Dr. Chandravipa Thanasopol, and Mr. Manas Jamveha. We look forward to their support and more productive years to come.

Celebrating HM Queen Sirikit's Birthday

Mr. Suwat Tantipipat, Governer of Chiang Mai presided over the opening ceremony

From 28 to 29 August 2006, the BGO organized the annual symposium on 'Biodiversity Conservation of Thailand' to celebrate Her Majesty Queen Sirikit's 74th birthday anniversary, at the Lotus Png Suan Kaew Hotel. About 500 participants attended the event.

QSBG Highlights

On 27 January 2006, HM Queen Sirikit paid a visit to the 'Aquatic House' and the 'Orchids and Ferns House' at QSBG.

Mr. Yongyuth Tiyapairut, MoNRE Minister receiving Her Majesty upon arrival

Inside the Orchids and ferns House

The Aquatic House and the display of carnivorous plants inside the house

At the Visitor Center, HM the Queen observed the progress of the project "Diversity and Ecology of Fireflies in Thailand".

HM Queen Sirikit graciously gave the financial support of 2 million baht to support the activities of the Firefly Project.

QSBG Activities

A new project launched at QSBG

Commenced in July 2006, **Thailand Insect Group for Entomological Research (TIGER)** project is a collaborative arrangement among Queen Sirikit Botanic Garden (QSBG), the University of Kentucky (UKY), Natural History Museum of Los Angeles (NHM), and Department of National Parks, Wildlife and Plant Conservation (DNP), Bangkok.

The goal of TIGER project is to survey insect diversity in a wide range of habitats in Thailand. Having diverse habitat types, the country falls within two of the top eight biodiversity hotspots: Sundaland (in the southern peninsula) and Indo-Burma (the majority of the country). Thailand is also a meeting spot of many faunal elements including the Himalayas, east Palearctic and Oriental Region.

Collections will be conducted over 30 national parks covering a maximum of biological and geographic richness of the country during a three-year-period. The sampling, in collaboration with colleagues in the national parks, involves the use of Malaise traps, pan traps and soil extractors (Winkler litter apparatus). These traps collect a large number of insect specimens, especially the core groups of Hymenoptera (ants, bees and wasps), Diptera (flies), Coleoptera (beetles), and Homoptera (true bugs). The traps have been set up by trained park personnel who operate them and send the samples at regular intervals to the QSBG where the samples are sorted and the material is then sent to an international team of entomologists for identification and research purposes. Returned specimens (including type material) will be housed in the insect collection of the QSBG, Chiang Mai and the Insect Museum of DNP, Bangkok. The accumulated information will be recorded in a database developed by the University of Kentucky.

This collaborative project is a good example of an outstanding network of the national parks, and other collaborators with the aim to build up a thorough studied insect collection for Thailand. Subsequent information obtained from the TIGER project will be utilized in many forms, including interactive keys, a database showing collection and species information (abundance, distribution and elevation) and publications resulting from the efforts.



Training Courses and Workshops

The 11th Parataxonomist Training

The training workshop was organized during 21 to 24 March 2006 with the theme of "Ethnobotany". Field studies were conducted at Mae Khum Pong, Amphur Doi Saket, Chiang Mai.

The Parataxonomist Training Workshop is organized annually with the aim to support plant conservation by raising awareness in various aspects of the relevant issues. For the effectiveness of field studies, the workshop normally accommodates not more than 50 participants. If you are interested to attend the course, please contact the Education Section, Technical and Research Department.

Tel: (053) 84-1233 (Ms. Kanokwan Calhoun)

An International Conference on "***Botanical Illustration for Tropical Plants***" was jointly organized by the Queen Sirikit Botanic Garden and the Guild of Asian Botanical Artists (GABA) during 31 July - 3 August 2006. Following the conference, a workhop on scientific illustration was conducted by the Sci-Art Network of Thailand. Three hundred botanical illustrations were exhibited from 31 July to 31 August 2006, at the QSBG Natural Science Museum.

Research Notes

Ethnobotanical Survey at Thai-Myanmar Border

In October 2005, Ms. Songsri Pipitkul, Ethnobotany Section, TRD, along with Mr. Zaw Min Oo, Guest Researcher, Global Initiative For Traditional Systems (GIFTS) of Health, Oxford, UK; visited a Karen Village near the Thai-Myanmar border in Mae Sot, Tak Province. The visit was part of the research on knowledge and use of traditional medicine by refugees and forced migrants at the Thai-Myanmar border region. Among interviewed herbalists was a Karen monk named 'Thaw Ma' who has been practicing traditional medicine for more than 3 decades. He acquired the herbal knowledge from his family which has a long history in herbal medicinal practices. To date, Monk Thaw Ma continues to treat patients whose illness is in a wide range from common health conditions to elephantiasis. Information on 25 kinds of herbal plants used for 45 remedies was collected during the field trip.

Orchids Restoration at QSBG

The Queen Sirikit Botanic Garden's forests are enriched with orchid diversity. Dr. Santi Watthana, QSBG Botanist has identified 84 species from 34 genera of wild orchids found in the Garden's forests. Moreover, there are some unknown species awaiting taxonomical identification. However, the population numbers of many species are declining due to habitat loss

and illegal harvesting, hence the threatened status of the species, e.g., *Vanda coerulea* Griff. ex Lindl. (Blue Vanda).

Since 1997, staff of the Tissue Culture Laboratory, TRD have been conducting micropropagation of native orchids under the Plant Conservation Program. With the assistance of the Botanists from the Herbarium Section, orchid plantlets of the species with distribution found in the QSBG' vicinity were reintroduced to their natural habitats.

More than 5,000 orchid plantlets (grown *in vitro* from seeds) have been released this year. The species included *Rhynchostylis retusa* Blume, *Dendrobium thrysiflorum* Rchb.f., *Dendrobium chrysotoxum* Lindl., etc.

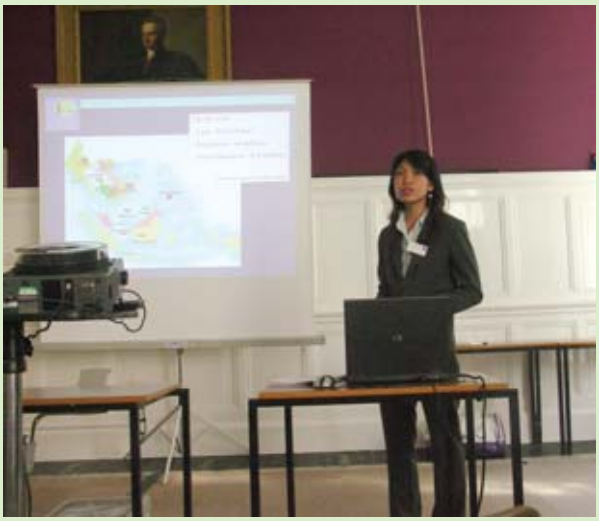
Staff Notes

BGCI's 6th International Congress on Education in Botanic Gardens

Participants of the Congress

During 10th September to 14th September 2006, Miss Ratchuporn Spanuchat, Staff of the Natural Science Museum, TRD; received a fellowship from the Botanical Gardens Conservation International to attend the 6th BGCI International Congress on Education in Botanic Gardens: The Nature of Success - Success for Nature. The congress venue was at the University of Oxford Botanic Garden with fields studies at many interesting places.

Ratchuporn has shared her experience attending the Congress on pp. 14-15.



Giving a presentation on a conceptual paper "Design of Garden for the Blind"

Congratulations !!

A beautiful healthy baby girl-Taya was born on 9 May 2006. The proud parents are Ms. Soraya Raveewan, Technical and Research Department; and Mr. Meesilp Raveewan.

ASEAN-China Workshop

Delegates in the ASEAN-China Workshop

Dr. Suyanee Vessabutr, Head, Technical and Research Department, along with other 2 representatives from the Ministry of Natural Resources and Environment attended the ASEAN-China Workshop on Botanical Gardens Management and Plant Conservation, at Bogor Botanic Garden, Bogor, Indonesia, during May 15-19, 2006.

Opening address by Dr. Irawati, Director Center for Plant Conservation Bogor Botanic Gardens-LIPI

Dr. Suyanee, representing the Thai delegation, presented "Thailand's Country Report on Plant Conservation"

Tour of the Bogor Botanic Gardens

The Orchid Genus *Disperis* in Thailand

Hubert Kurzweil*

Disperis is a genus of 74 terrestrial orchids found in forest, grassland and scrubland in Africa, Madagascar and several Indian Ocean Islands. In addition, the genus is also known in tropical and subtropical Asia where ten species have been recognized in the past (Seidenfaden, 1969). However, already Gunnar Seidenfaden suspected that all of these Asian *Disperis* species are merely forms of one widespread and variable species. This has later also emerged from a thorough examination of herbarium material of all previously recognized taxa (Kurzweil, 2005), and the single Asian species was therefore listed as *D. neilgherrensis* Wight, which is the oldest name. Previously, the specimens from Thailand were referred to *D. siamensis* Rolfe ex Downie, alluding to the old name of the country.

In its present concept *D. neilgherrensis* is known from several widely scattered localities, ranging from Sri Lanka as its western-most occurrence to Japan in the north and New Guinea in the east. Specimens have been collected in southern India (the species name is originally derived from the Nilgiri Hills in Tamil Nadu), the central parts of Sri Lanka, in Thailand, Hong Kong, southern Japan, southern Taiwan, the Caroline island Pulau, the Philippines, Indonesia (Java, Flores, Moluccas, Irian Jaya) and Papua New Guinea. Plants of this species are sometimes very small and it can be assumed that they are frequently overlooked by collectors; it is therefore possible that the species is actually more widespread in the region.

In Thailand, the species is found in the northern, north-eastern and southern parts of the country. The type specimen of *D. siamensis* was collected by Dr. A.F.G. Kerr on Doi Suthep in Chiang Mai Province in 1911, and was later deposited in the Herbarium of the Royal Botanic Gardens Kew (an isotype was also deposited in Copenhagen). Later another collection was made on the same mountain. Further collections of the species were made near Chiang Dao (also in Chiang Mai Province), near Lom Sak in Phitsanulok Province, as well as on the Peninsula near Nakhon Sri Thammarat. The plants are found in forested habitats and in grassy places. Flowering of the Thai specimens has been recorded in July and August.

The genus *Disperis* does not have any close relatives in the orchid flora of Thailand, as it belongs to a group of genera that is centred in Africa and Madagascar. The nearest allies among the Thai orchids are *Habenaria* and related genera, which share the terrestrial habit, the occurrence of root tubers as well as the structure of the flowers and especially the gynostemium (or column).

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As can be seen from the following brief description, *D. neilgherrensis* is extremely variable in the size of all of its features. However, the general structure of the plant and particularly the shape of the lip and the lip appendage is uniform throughout (the latter feature is otherwise very diverse in *Disperis* and is generally used as a major taxonomic character). While the size of all plant parts is greatest in Indian material, the specimens from Thailand are among the smallest in the species.

***Disperis neilgherrensis* Wight**

SYNONYMS: *D. zeylanica* Trimen, *D. zeylanica* var. *nilgirensis* (Wight) Pradhan, *D. siamensis* Rolfe ex Downie, *D. javanica* J.J. Sm., *D. philippinensis* Schltr., *D. palawensis* (Tuyama) Tuyama, *D. lantauensis* S.Y. Hu, *D. orientalis* Fukuy., *D. rhodoneura* Schltr., *D. papuana* Michol. & Kraenzl.

Plants terrestrial, very variable in size from 4 to 38 cm (the examined Thai specimens range from 4 to 14 cm), with underground root tubers; leaves one to three in number, 0.3 to 4.3 cm long (less than 1 cm in Thailand); inflorescence lax, mostly with 1-5 flowers. Flowers white, pink or light purple; median sepal erect, narrow, adnate to the petals to form a shallow hood; lateral sepals pendent, 5-15 mm long (6-6.8 mm in Thai specimens), basally fused, each one with a shallow conical spur; lip with narrow basal claw and a rotund, stalked blade with a median and papillose hump, appendage of two reflexed or rarely ascending processes; gynostemium (or column) with a reflexed anther which is covered by a membranous central rostellum lobe, lateral rostellum arms filiform or lorate, stigmas lanceolate, at the sides of the median rostellum lobe.

Disperis neilgherrensis.
Drawn by W. Hitchcock.

Disperis neilgherrensis
Photo: J.B. Comber. Reprinted from *Malayan Orchid Review* 38 with the kind permission of the editor.

For specialised taxonomic information, please see:

1. Kurzweil, H. 2005. Taxonomic studies in the genus *Disperis* (Orchidaceae) in Southeast Asia. *Blumea* 50: 143-152.
2. Seidenfaden, G. 1969. Contributions to the orchid flora of Thailand. *Botanisk Tidsskrift* 65: 100-162.
3. Seidenfaden, G. 1977. Orchid genera in Thailand V — Orchidoideae. *Dansk Botanisk Arkiv* 31: 1-149.

Note: The study was originally carried out at the Compton Herbarium, South African National Biodiversity Institute, Claremont 7735, South Africa.

My Experience at the BGCI's 6th International Congress
on Education in Botanic Gardens: The Nature of Success: Success for Nature
at
The University of Oxford Botanic Garden
10th September – 14th September 2006

Ratchuporn Spanuchat
Natural Science Museum, Technical and Research Department
Queen Sirikit Botanic Garden

During 10th September – 14th September 2006, I had an opportunity to attend the BGCI's 6th International Congress on Education in Botanic Gardens in the issue of "The Nature of Success: Success for Nature" which organized at University of Oxford Botanic Garden . The aim of the meetings was to take forward the implementation of Target 14 of GSPC.

During the congress, the BGCI, University of Oxford Botanic Garden and the Royal Botanic Gardens, Kew; arranged a wide range of activities with extensive and interesting topics and themes. The congress, in my opinion, was very successful and fruitful to all participants. It was organised so efficiently that I benefit substantially in terms of gaining new knowledge and also having an opportunity to exchange ideas with people from all over the world about educational programmes in each country.

I gave presentaion about Queen Sirikit Garden for the Blind under the conference session 'Working with Challenging Audiences'. Since there is only few places in Thailand providing facilities for the blind especially on botanical activities, the conference gave me a chance to learn from other garden organisers about garden designs and services for people with disabilities.

Working as an educator at the QSBG Natural Science Museum involving environmental education, I am interested in collecting information related to educational activities and interpretation techniques. In my view, the Harcourt Aboretum, University of Oxford Botanic Garden, the Pitt Rivers Museum and the Kew Gardens are all excellent models for education because of their tactics in promoting attention from the public. For example, interpretive design is made simple, clear, attractive and in harmony with the surrounding environment.

Apart from the knowledge obtained through paper presentations, workshops and posters, I also had a great opportunity to join both the pre- and post-congress tours. I learned a lot about the way to conduct various tasks in my botanic garden. For example, the Eden Project has excellent interpretation signs on the use of bananas in daily life. Another example of the useful knowledge obtained is the adventure programmes for school children in Benmore Botanic Garden which encourage children to learn about their responsibility for the nature. As my background is botany, I was impressed with interesting temperate plant species, some of which I have never seen in Southeast Asia.

I am enlightened by the attitudes, concepts and ways to support educational activities in botanic gardens. I plan to share this fruitful experience with my colleagues in my home country especially on how to increase people's awareness of plants and conservation. I will also try to make our education programmes more relevant to people's lives.

Finally, I would like to thank the organizing committee for the Botanic Gardens Conservation International (BGCI) and Queen Sirikit Botanic Garden for giving me this great chance to attend the congress. I also would like to extend my grateful to all the staff for arranging this wonderful conference and the pre-and post-congress tours.

General Background

Situated in Southeast Asia, Thailand is located from 5°27′ to 20°17′N, and 97°12′ to 105°37′ E. Its neighbors are Cambodia and Laos to the east and northeast, Myanmar to the west and northwest; and Malaysia to the south. With the size of 513,115 km^2 and varied climatic conditions and altitudes, the country comprises 6 diverse ecological zones making Thailand one of the richest countries as regards to biodiversity.

The country is endowed with wide varieties of flora and fauna, accounted for 8-10% of plants and animals diversity in the world. The estimated or recorded number of species found in Thailand in each major taxonomic group is shown in Table 1.

Table 1: Estimated/Recorded Number of Species in Thailand

Taxonomic Group	Number of Species
Flowering plants	15,000
Pteriophytes	658
Gymnosperm	32
Non-vascular	2,000
Mammals	302
Birds	982
Reptiles	350
Amphibians	137
Marine fishes	2,000
Fresh water fishes	720
Estuarine/seawater fishes	1,672
Marine mollusks	2,000
Marine invertebrates	11,900

Sources: World Bank, 2004; ONEP, 2006

Biological Conservation Measures in Thailand

From the past century, Thailand has developed a number of important policies and legal frameworks to support the conservation and management of wildlife, forests, plant resources, etc. In 1896, the Royal Forest Department (RFD) was established to conserve national forest resources. The Law for the Conservation of Wild Elephants was promulgated in 1921. During 1930s, the alarming rate of deterioration of the country forests caused the Forestry Act to be passed in 1941. With the interest and assistance of international partners in 1958, namely the IUCN and the US National Park Service, the Ministries of Agriculture and Interior selected 14 sites to be further established as national parks and protected areas with the draft enabling legislation. Further conservation acts were passed in the ensuing years. In 1960, the Wild Animals and Reservation Act was passed, followed by the National Parks Act in 1961; and the National Forest Reserves Act in 1964. In more recent years, protected areas are managed in conformance with the National Parks Act of 1961, the National Forest Reserves Act of 1964, and the Wild Animal Reservation and Protection Act revised in 1992. In addition, the Fishery Act revised in 1994 is important to the protection of aquatic flora and fauna and their habitats, particularly within marine parks and outside protected areas.

Table2: Legal and Institutional Frameworks on Biodiversity Conservation in Thailand

Year	Legislation/Act
1921	Law for the Conservation of Wild Elephants
1941	Forest Act
1960	The Wild Animals Reservation and Protection Act,The Fishery Act
1961	The National Parks Act
1964	The National Forest Reserves Act
1979	Conservation Policy Guidelines (prepared by the National Environment Board in co-operation with IUCN)
1983	Ratification of CITES
1985	The 1st National Forest Policy
1991	The 2nd National Forest Policy
1992	Wild Animal Reservation and Protection Act (revised), The Establishment of the Botanical Garden Organization (BGO)
1994	The Fisheries Act (revised)
1999	Plant Variety Protection Act,The Act on Protection and Promotion of Thai Traditional Medicinal Intelligence
2002	Establishment of the Ministry of Natural Resources and Environment (MoNRE)
2003	Ratified Convention on Biological Diversity (CBD)

Sources: World Bank, 2004; Vessabutr, 2005

In 1983, Thailand ratified the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and became the 80th member of the Convention. CITES-Thailand has been effective in dealing with trade in plant within the CITES System, especially wild orchids, cycads species and tree ferns.

Prior to Thailand's ratification of the Convention on Biological Diversity (CBD) in 2003, the country undertook a great deal of preparations for the Convention. In 1999, the Plant Variety Protection Act was enacted providing protection of novel varieties, and native plants - both landraces and wild species. The Act on Protection and Promotion of Thai Traditional Medicinal Intelligence was passed in the same year to protect and promote traditional Thai medicinal plants and practices. In 2001 alone, there were 14 Acts, two Cabinet Resolutions, five national plans and policies; and two departmental regulations related to the conservation of biodiversity (World Bank, 2004). Thailand ratified the CBD on 31st October 2003 and became the 188th member of the Convention on 29th January 2004. At present, the Office of Natural Resources and Environmental Policy and Planning or ONEP, MoNRE, is the National Focal Point for CBD.

Judging by the number of legislations passed by the authorities, and the involvement in various important international conventions; there has been no lacking of interest from the Thai government. To date; however, implementation and monitoring mechanisms still pose challenges which may lie in the implementation of the laws. As a result the degradation of many natural resources continues.

Table 3: Number and Area of National Parks, Protected Areas, and Botanical Gardens in Thailand

Category	Total Number	Total Area(sq km)	% TotalCountry Area
National Park	82	63,464.33	12.37
Forest Park	57	870.49	0.17
Wildlife Sanctuary	42	36,758.53	7.16
Non-hunting Area	50	4409.59	0.86
Watershed Conservation Area	177	93,090.00[a]	18.14[a]
Botanical Garden	15	58.96	0.01
Arboretum	54	36.08	0.01
Mangrove Conservation Site	1	428.00	0.08
Biosphere Reserve	4	261.00 +	0.05 +
RAMSAR Site [b]	10	3,731.80	
World Natural Heritage Site [c]	2	[a]	
ASEAN Heritage [c]	2	[a]	

[a] Having areas overlapping with other categories, e.g., national parks, etc.
[b] 8 out of 10 RAMSAR sites are protected areas.
[c] The World Heritage and ASEAN Heritage Sites are either wildlife sanctuaries or national parks.

Source: ONEP, 2006

Plant Conservation Efforts in Thailand

Thailand contains an estimated 20,000 vascular plants (Smitinand, 1995), among these, over 2,000 species have been used by indigenous people and reported to be of medicinal value (Phuphathanaphong, 1990). During the past half century, the country has lost much of its plant resources due to deforestation, destruction of their habitats and over collections.

The Thai government has administrated activities concerning plant *in situ* conservation through the establishment of national parks and forest reserves since 1964. At present, the national parks and forest reserves cover approximately 20% of the country area (World Bank, 2004).

Botanic Gardens in Thailand

In 1942 the Royal Forest Department (RFD), Ministry of Agriculture and Cooperatives, initiated the Phu Kae Botanic Garden in Saraburi Province with palms and medicinal plants as its collections. The second botanic garden was founded in 1968 at Khoa Chong, Trang Province in southern Thailand. Subsequently, the RFD established more botanic gardens throughout the country for the main purpose of public amenity and *in situ* conservation. However, the RFD's botanic gardens are mainly represented by woody trees, shrubs and climbers, hence, their status and structure are in the category of arboreta or forest parks (Santisuk, 2003). The RFD's 14 botanic gardens (by name) and 47 arboreta are now under the administration of the Department of National Parks, Wildlife, and Plant Conservation, Ministry of Natural Resources and Environment.

In October 1991, a conference on biological diversity was held in Bangkok by the International Council of Scientific Union (ICSU)-Thai Sector. The conference concluded with the realization that Thailand was losing its precious plant resources at an alarming rate, while more than 40% of the plant species were still unidentified and their potential values were yet to be discovered. A suggestion was made to set up an organization to be responsible for *ex situ* conservation of native plants and enhance botanic study and research. As a result, the Botanical Garden Organization (BGO) was established on April 7, 1992. The BGO has a status of a state enterprise attached to the Prime Minister's Office. In October 2002, as a result of the government agencies restructuring, the Ministry of Natural Resources and Environment (MoNRE) was established; and the BGO was transferred to be under the administration of the new Ministry since then.

Phu Kae Botanic Garden, Saraburi (est. 1942)

Roles of Queen Sirikit Botanic Garden

The Botanical Garden Organization is responsible for the establishment and administration of any botanical gardens, regional plant collection centers, and botanical museums that may be part of these gardens. Following the BGO establishment, the Mae Sa Botanic Garden at Mae Rim, Chiang Mai was transferred from the Royal Forest Department (RFD) to be under the administration of the BGO. The Garden is situated at the foothills of Doi Suthep-Pui which is high in biodiversity, with dry deciduous forest, semi-evergreen forest and evergreen forest as dominant vegetation.

To honor HM Queen Sirikit on her 60th birthday anniversary in August 1994, the BGO requested for Her Majesty's name to be the title of the Garden and was granted her royal permission in April 1994. Therefore, the Mae Sa Botanic Garden is known nowadays as Queen Sirikit Botanic Garden or QSBG as its short name (BGO, 1996). The QSBG has 3 satellite gardens, namely: the Rayong Plant Collection Center for eastern Thailand, the Ban Rom Klao-Pitsanulok Plant Collection Center for lower

northern Thailand; and the Khon Kaen Plant Collection Center, for northeastern Thailand. The aims of the QSBG and its satellite gardens are:

- ★ To gather fundamental knowledge of Thai plants
- ★ To conserve their genetic diversity, and
- ★ To strengthen studies and research on Thai flora.

The QSBG Plant Conservation Strategy was developed in 1997, comprising 7 programs, namely, plant living collections, herbarium collections, seed collections, *in vitro* collections, documentation and database, education, and collaboration (Vessabutr, 1997). It was aimed to provide the first stage guideline for the development of an action plan for plant conservation activities at Queen Sirikit Botanic Garden. Some programs have already been implemented, e.g., *in vitro* conservation; while others require the availability of the resources, as well as a team effort from various disciplines.

QSBG Partnership for plant conservation

Queen Sirikit Botanic Garden has joined the Botanical Gardens Conservation International (BGCI) since 1997. The garden maintain close link with the BGCI-Headquarters, UK, as well as BGCI-Regional Office in Singapore. During 22-25 August 2005, QSBG co-hosted with the BGCI in organizing the 2nd Southeast Asian Botanic Gardens (SEABG) Workshop. The workshop was part of the BGCI's Investing in Nature (S/E Asia) program, and was aimed to assist staff of regional botanic gardens improve their horticultural skills in maintaining their respective plant collections.

In 2002, QSBG became a member of the BioNet International, UK.; an international not-for-profit initiative dedicated to promoting taxonomy, especially in the biodiversity rich but economically poorer countries of the world. Both BioNet International, and the BGCI are amongst the founding members of the 'Global Partnership for Plant Conservation' (Wyse Jackson *et al*., 2005).

Roles of NGOs and Private Sectors

Various non-government agencies (NGOs) have been involved in biodiversity conservation. However, their attention is paid more to animals than plants. WWF Thailand works for 'Wildlife Trade Campaign' and successfully reduced illegal wildlife trade between 2000- 2004. Several societies are devoted to the conservation of elephants. The World Heritage Management Project (WHMP) has set up 'Monitoring Systems for Tigers and Prey'. Their activities also include promoting conservation awareness among local communities, local NGOs, and education institutes (Pattanavibool *et al*., 2005).

As for the involvement of private sectors in biodiversity conservation, the Petroleum Authority of Thailand (PTT) is the main collaborating company in the forest rehabilitation program. The program has been initiated by the Ministry of Agriculture and Co-operatives in 1994 to commemorate the anniversary of HM the King's 50th year of accession to the throne. The objective is to carry out reforestation along the route of the first gas pipeline from Myanmar to the gulf of Thailand, passing through three major eco-regions of the WEFCOM complex. The total investment of PPT has been over 120 million baht (World Bank, 2004).

On 26th December 2004, a powerful earthquake struck underneath the Indian Ocean; triggering massive tidal waves to slam the coastline of southern Thailand. Numerous private sectors, foundations, and volunteers have contributed to restore coral reefs, mangrove forests, and beach forests (ONEP, 2006).

Roles of Local Communities

Biodiversity conservation at the community level has been parts of Buddhism, and other cultural establishments as traditional practices. Buddhist monks play active roles in forest conservation. The most well-known rite is the 'Trees Ordaining', by wrapping robes around trees trunks to dissuade people from cutting the forest.

With a financial support from the World Bank, sixteen temples in Nakonratchasima province have formed the core of a community management project involving environmental education, plant propagation; and serving as training center for forest management skills (World Bank, 2004).

Various ethnic groups live in forests and watershed areas important for conservation. Each tribe is distinct in culture and language, and usually live in mono-cultural villages. The 'Karen' has settled in what is now Thailand several hundred years ago, while the other groups are more recent immigrants. The Karen people are well-known for their living in harmony with nature, following traditional practices which are handed down through generations.

There has been a movement to have the Community Forest Bill which will allow the right of such people to continue living in or using the forest under certain conditions. Opposing opinions on the ability of the local people to conduct sustainable utilization of the forests has caused the Bill to stall in the Parliament.

GSPC Targets Challenges

Thailand has undertaken effective activities and projects on biodiversity, especially after the country ratified the CBD in 2003. However, projects related to the 2010 target have not been launched officially (ONEP, 2006).

Thailand supports the ecosystem approach (EA) for biodiversity conservation through various ASEAN and the Mekong River Commission (MRC) mechanisms. At the implementation level in promoting EA across national borders, Thailand works with international organizations such as, the International Tropical Timber Organization (ITTO), World Wildlife Fund for Nature (WWF), World Conservation Union, (IUCN), and the Asian Development Bank (ADB).

There still remain constraints to achieve the targets, which are

1. Lack of awareness among concerned agencies
2. Lack of interest among stakeholders
3. Lack of capacity building for resource persons
4. Inadequate financial support
5. Inadequate information dissemination

Best Practices in BG Management and Plant Conservation

The threat in plant diversity loss is one of the greatest challenges for humankind. It has become a key component of the Botanic Garden Global Mission – to halt the destruction of the plant diversity that is essential to meet the present and future needs of the world community (Richardson and Wyse Jackson, 2003). Plant conservation is not only a matter of securing the survival of rare or endangered species in designated reserves. Such collections are often of limited value to the long term conservation of the species unless they are complimentary to longer term plans to conserve the species *in situ*.

Conservation is a long-term commitment and requires team effort. There is often a poor understanding among BG staff of what botanic gardens have to offer to support plant conservation. To meet the goals of GSPC effectively, it is important that BG

staff realize the importance of biodiversity conservation and understand their roles to meet the conservation targets.

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Vanda coerulea Griff. ex Lindl.