BGO NEWSLETTER

THE BOTANICAL GARDEN ORGANIZATION

PRIME MINISTER'S OFFICE

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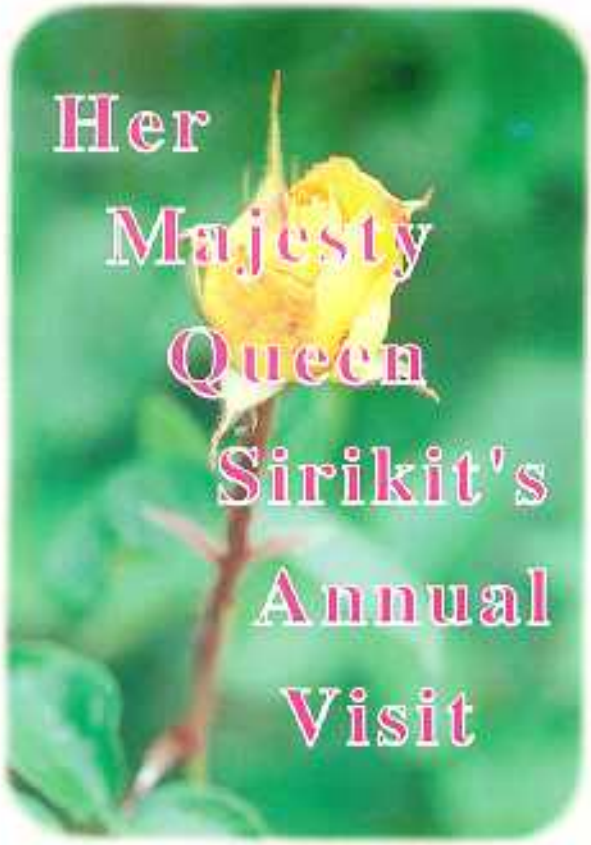


On February 2, 1999, Her Majesty Queen Sirikit paid the 4 th royal visit at the QBG.

Her Majesty met with Mr. Jurintr Laksanavisith, Minister to the Prime Minister's Office (right), and Mrs.Panit Nitithanprapas, the new BGO Chairman (second right).

H. M. the Queen visited the Firefly Project exhibition at the Information Center.

BOARD MEMBERS

THE BOTANICAL GARDEN EXECUTIVE BOARD

1. Mrs. Panit Nitithanprapas	Chairman
2. Prof. Dr. Thawatchai Santisuk	Committee
3. Assoc. Prof. Dr. Pongsak Angkasith	Committee
4. Assoc. Prof. Dr. Suree Bhumibhamon	Committee
5. Assoc. Prof. Dr. Pathom Manirojana	Committee
6. Asst. Prof. Dr. Pakorn Priyakorn	Committee
7. Dr. Pichit Akrathit	Committee
8. Mr. Prapart Niyom	Committee
9. Mr. Sunit Teevavej	Committee
10. Dr. Weerachai Nanakorn	Committee and Secretary

THE BOTANICAL GARDEN HONORARY & ADVISORY BOARD

1. M.C. Bitsatej Rajani	Thailand
2. Airforce Gen. Kamthon Sinthuvanon	Thailand
3. Mrs. Nongnut Tansatjaa	Thailand
4. Prof. Sir Ghillean T. Prance	U.K.
5. Prof. Tetsuo M. Koyama	Japan
6. Prof. Kunio Iwatsuki	Japan
7. Prof. Kai Larsen	Denmark
8. Prof. Mike Balick	U.S.A.
9. Prof. Peter H. Raven	U.S.A.
10. Prof. Bertil Nordenstam	Sweden
11. Prof. Xu Zaifu	China

BGO NEWS

New Minister

Mr. Jurintr Laksanavisith

Mr. Jurintr Laksanavisith has replaced Mr. Chaiyot Sasomsup as Minister to the PM's Office, responsible for the Botanical Garden Organization in Sept, 98.

Executive Board Chairman

Mrs. Panit Nitithanprapas

Ms. Panit Niti - thanprapas, Permanent Secretary, the Prime Minister's Office became the third Chairman of the BGO in Nov, 98.

Board Members

Professor Dr. Tawatchai Santisuk, Specialist, the Royal Forest Department, has been with the BGO since the establisment of the organization in 1992.

Dr. Weerachai Nanakorn, Director, Queen Sirikit Botanic Garden has served as a committee and secretary since July, 1993.

Dr. Pongsak Anghasith, Dean, Faculty of Agriculture, Chiang Mai University joined the BGO in 1997.

The six other new board members are:

Dr. Surse Bhumibhamon
Kasetsart University

Dr. Padoon Manirojana
National Institute of Development Administration

Dr. Pichai Akrathit
Office of Capital Market Research and Development

Mr. Prapart Nipom
Ministry of Finance

Dr. Pakorn Privakorn
National Institute of Development Administration

Mr. Suwit Teerarat
Bangkok Municipality Administration, City Market Office

Dr. Weerachai Nanakorn
Queen Sirikit Botanic Garden

Dr. Tawatchai Santisuk
Royal Forest Department

Dr. Pongsak Anghasith
Chiang Mai University

The QBG staff would like to express their sincere gratitude to the out-going executive board chairman and members for their commitment and contribution while sitting in the committee.

Obituary

Professor Dr. Sanga Sabhasri (1932-1999)

First Chairman of the Botanical Garden Organization

The death of a remarkable man – Prof. Dr. Sanga Sabhasri, who passed away on Jan 29, 1999, is a great loss, not only for the QBG staff but also for the national and international community.

Professionally, Professor Sabhasri played an eminent role in scientific development in Thailand. While serving in many key positions such as Chairman of the University Council for several universities, Secretary General of the National Research Council of Thailand, and Minister of the Ministry of Science, Technology and Environment, Prof. Sabhasri did his utmost to initiate international cooperation for the benefit of education and research development. He was one of the key men who were instrumental in the development of the Queen Sirikit Botanic Garden. By establishing the "Sanga Sabhasri Research Foundation", he contributed to biodiversity conservation which will have far reaching effects.

As a modest person, Prof. Sabhasri was dearly loved by everyone who knew him. He is survived by his wife Associate Prof. Vachira, and their only son Dr. Chayodom. The QBG community extends their deepest sympathy to Professor Sabhasri's family.

He will always be remembered.

To honour his lifelong work and salute his dedication to natural resources conservation, the First Sanga Sabhasri Seminar on Biodiversity and Environment was organized at the QBG on May 13, 1999. About ninety participants from seven countries attended the seminar which was hosted by the Sanga Sabhasri Research Foundation, the QBG, Kasetsart University, Chiang Mai University, and the Royal Forest Department.

QBG NEWS

Natural Science Museum

The QBG Natural Science Museum was opened to the public on April 10, 1999. Mr. Jurin Laksanavisit, Minister to the PM's Office presided over the opening ceremony. The exhibition featured scientific illustrations of orchids, birds, and butterflies by three well-known artists namely, Ekhachai Oadumpai, Kamol Komolphalin, and Vichai Malikul.

Future Satellite Garden

A royal initiative project to establish a satellite garden of the QBG will begin soon at Ban Romklao, Pitsanulok province. Due to HM Queen Sirikit's concerns on natural environment conservation and the welfare of the local people, a plant collection center will be established to help protecting watershed areas and supporting the villagers in sustainable utilization of the forest resources. Mr. Valobh Sukont, QBG Deputy Director, led the team to conduct a preliminary survey for an appropriate location this April. The cooperation from the regional forest officers and the military is much appreciated.

QBG-DANCED Project

During May 3-7, 1999, Dr. Weerachai Nanakorn was in Copenhagen, Denmark to participate in the selection process for a Chief Technical Advisor of the DANCED supporting project on "Capacity Building in the Field of Biodiversity at Queen Sirikit Botanic Garden". Congratulations to Dr. Peter Kurt Hansen, who has been chosen for the position. The QBG staff members are looking forward to the start of the project and working at full capacity with him.

Forest &People Project

A Thai Danish Research Cooperation on **Forest and People in Thailand Project** has been granted in June 1999. Funding agencies are Danish Environmental Research Program and DANCED. The QBG will be involved in the biodiversity aspect of the project.

Overseas Training

Two staff members of the Technical and Research Department attended a Botanical Internship Program at Museum Nationale d'Histoire Naturelle, Paris, France. Mr. Sampan Khamnapat and Mr. Tee Havananda, each received a 2 - month training at various places and laboratories.

Through the Thai-Japanese Social Development Program, Miss Prapawalai Kochsila, Public Relations Officer, participated in the program and visited Japan during Jan 8 - Feb 10, 99.

Mr. Paisarn Thongsorn, the Garden Department, was invited by Dr. Collin Ridsdale, Consultant, the Netherlands Management Corporation Program, to see greenhouse management at Hortus Leiden, Rotterdam-Blijdorp, Burgers Bush Arnhem, the Netherlands, and the National Botanical Garden, Belgium.

FORGENMAP Training

Mr. Wittaya Pongamornkul attended the Seed Procurement Training Course at Khao Yai National Park during Nov 9-19, 99; and Mr. Arsa Leudskulchai attended the Tree Climbing Course at Seed Management Center, Lampang, during Feb 10-20, 99. The training courses were organized and sponsored by the Forest Genetic Resource Management Program (FORGENMAP).

SEADENDRO Workshop

During Jan 10-16, 99, Miss Sawitree Srasrirat, Mr. Sirot Chutiwat, Mr. Wittaya Pongamornkul and Mr. Watchana Boonchai participated in SEADENDRO FIELDWEEK 99. The workshop was jointly hosted by the Tree-Ring Laboratory of the Lamont-Doherty Earth Observatory, USA, the Department of Forest Resources, Chiang Mai University, and Queen Sirikit Botanic Garden. FIELDWEEK 99 brought together international instructors and participants for an intensive workshop on basic dendrochronological techniques, and field methods for screening and sampling species that may prove useful for future dendrochronological studies in tropical Southeast Asia.

Rajabhat Workshop

During Jun 21-25, 99, the QBG and Office of Rajabhat Institutes Council jointly hosted a workshop on the Establishment of Rajabhat Botanical Gardens. Mr. Phairoj Lohsunthon (second left), Deputy Minister, Ministry of Education presided over the opening ceremony.

BRT Meeting

During Oct 12-15, 98, Dr. Weerachai Nanakorn and some QBG staff attended the 2 nd BRT Meeting at Chareon Thani Princess Hotel, Khon Khean Province. On 13 Oct, Dr. Weerachai was a guest speaker, giving a presentation on "Some Rare Plants of Northeastern Thailand".

The QBG team went to observe the progress of the Firefly Project-northeastern section, at the Entomology Dept, Khon Khaen University.

Dr. Yongyuth Waikakul (fifth from left), Head of the Entomology Department, received the team.

Dr. Yupa Hanboonsong (center), explained firefly rearing techniques under laboratory conditions.

Entrance Fee

The QBG started charging an entrance fee from April, 1999. The fee is a minimal:

Adult 20 Baht

Child 10 Baht

Car 50 Baht

The Garden is open daily from 8:30 am to 5:00 pm.

Index-Herbariorum

The QBG Herbarium

Address:	Queen Sirikit Botanic Garden, P.O. Box 7, Mae Rim, Chiang Mai 50180, Thailand
Telephone:	+66 53 298-171
Facimile:	+66 53 299-754
Email:	qbg@chmai.loxinfo.co.th
Status:	Prime Minister's Office
Herbarium:	All groups of plants. Mainly from Thailand and neighbouring countries. Worldwide coverage is planned.
No. of Specimens: (up to present)	15,000
Exchange:	Available: Thailand Wanted: Worldwide
Director:	Weerachai Nanakorn, Ph.D. (Combretaceae, Poaceae)
Curator:	Santi Watthana (Ericaceae)
Staff:	
Piyakaset Suksathan	(Pteridophytes, Marantaceae)
Monthon Norsangsri	(Poaceae, Rhamnaceae)
Surangraj Itdhamusika	(Orchidaceae)
Prachaya Srisanga	(Violaceae)
Sawitree Sasrirat	(Apocynaceae)
Woranuch Laongsri	(Polygonaceae)
Chaiyudth Glamwaewwong	(Papilionaceae)
Withaya Pongamornkul	(Medicinal plants)
Charun Maknoi	(Zingiberaceae)
Ratchada Pongsattayapipat	(Database Manager, Ethnobotany)

Periodical and serial works:

Illustrations to the QBG Flora 1-5, to be continued (in Thai with colour illustrations).

Annual Newsletter in English.

visitors

Mr. Jurintr Laksanavisith, Minister to the PM's Office visited the Garden soon after his appointment to announce his policy to the QBG staff and see the development of the Garden.

Mr. Yingpan Manasikan, MP and former Minister of Science, Technology and Environment visited the QBG twice this year.

His contribution and advice towards the Garden activities are very much appreciated.

Privy Councillor and Statesman, General Prem Tinsulanonda visited the Garden on Jan 3, 1999. From left: QBG Director, Gen Prem, and Mr. Jurintr, Minister to the PM's Office.

Mr. Pramarn Adireksarn, former Deputy Prime Minister, visited the QBG on Nov 1, 98.

About 90,000 visitors including foreign scientists visited the Garden during Oct, 98 to Jun, 99.

Research Note

A Rose Is Still A Rose – But Where Does It Belong?

A new botanical system based on DNA

Kai Larsen, Emeritus Professor, Aarhus University, Denmark

Hon. Advisory Board Member, QBG

Seven years ago, a project on a new system for the vascular plants based on genetic similarity was initiated at the Royal Botanic Gardens, Kew, England. About 100 scientists have worked under the leadership of three well known taxonomists, Mark Chase (Head of the Molecular Systematic Section, the Jodrell Laboratory, Kew, UK), Kare Bremer (University of Uppsala, Sweden); and Peter Stevens (Harvard University, USA).

The molecular technique has existed since about 1980, and numerous scientists have worked with various plant groups, e.g. Leguminosaes; to establish the relationship of cultivated beans. Many other families, not least among the Monocotyledons, have been studied and often astonishing results obtained. For example, it has been found that the genus *Acorus* is not related to the *Araceae*, where it was placed during the last 200 years. It has now been removed far from the *Araceae* and regarded as the most primitive living monocot taxon.

During the last seven years, the DNA-team has studied 565 genera representing all families of vascular plants and identified 3 genes in all groups. One of the genes is responsible for the enzyme that controls photosynthesis. The numerous data from this investigation were computer analyzed and a new system developed. This is the first time that a system has been based on the very fundamental of life – the genetic code.

Among the more revolutionary changes could be mentioned that Rosaceae are related closer to Urticales than to Fabales. The genus *Nelumbo* is not related to Nymphacaceae, that we have known for a long time, but it is new that its closest relative is the Platanaceae.

During the International Botanical Congress in Sidney, in 1981, one session convened by the late professor Rolf Dahlgren, University of Copenhagen, was dealing with new systems of vascular plants. One of the scientists presenting new evidence began her presentation with the words: "Systematic botany is a female science – you can always change your minds". During the second half of this century, an increasing number of systems have been proposed. Among the more prominent authors are Hutchinson, Takhtajan, Cronquits, Thorne, and Dahlgren. Some of these have second and third version of their systems causing many non-taxonomists (and even taxonomists) utterly confused. Has this finished now? Have we now got a system that will stand, in any case, for some time?

The results of the DNA project is published in the international periodical: Annuals of the Missouri Garden, St. Louis, USA; and will be presented at the International Botanical Congress at the same place in Aug, 1999.

Nymphaea 'SIR GALAHAD'

Vigorous tropical water lily for a large pool: planting depth 20-91 cm (8 in-3 ft). The star-shaped, white flowers open at night and are held well above the large,waxy leaves. Spread to 3 m (10 ft). Grow in full sun and divide in spring. In cold climates grow under glass in heated pool.

Nelumbo 'Angel Wings' (Perry D. Slocum 1984)

N. nucifera 'Shirokunshi' x *N.* 'Pekinensis Rubra.' U.S. plant patent No. 5799 issued in 1986. 20-24 white petals form flowers of 20-25 cm (8-10 in). Petals roll inward at the edges. Highly convoluted leaves, with a deep cup in the center of each, measure 45-48 cm (18-23 in) and grow to 0.6-1.2 m (2-4 ft).

Feature Article

The Role of Social Sciences in Attaining Sustainable Forestry

Dr. Sanga Sabhasri

Introduction

Development was equated with the exploitation of natural resources for economic progress, but evidence indicates that this process creates instability of the natural environment, resulting in unsustainable forest resources. Social science has entered forestry because forest resources are managed and conserved for the maximum benefit of mankind.

Forest resources are diminishing rapidly. Recent figures disclose that tropical and closed forests are reducing at a rate of 7.5 million hectares/year while open forests are disappearing at 3.8 million hectares/ year. This deforestation reflects present phenomena such as global climate change, global warming, and loss of biodiversity; all of which call for world attention.

Sustainable Forestry as an Approach to the Solution

Tropical forest sustainability has many facets. Each definition, or objective, invokes its own approaches to general questions. Four definitions suggest the range of possibilities:

1. The ecological characteristics of the forest must be sustained. Forest uses are regulated to maintain an ecological structure rather than aiming at productivity capacity or social benefit.

2. Production levels of forest products are sustained. The removal of resources from the forest is limited to renewal capacity.
3. The area of forested land is sustained. Long-term conversions of land from forest and vice versa must be balanced.
4. The growth of forest qualities is sustained at the same rate as that of social expectations. Removal of resources is limited to amounts below what will be replaced.

Each definition or objective raises social science issues because achievements are made through a set of social forces. These objectives cannot be satisfied at the same time or place. Also, the list does not include other common objectives, e.g. the sustainability of forest-dependent communities, regions, industries, climate, air, and water qualities that affect the productivity of non-forest environments. These additional objectives are significant in the politics of "sustainability".

Causes for unsustainable forest management systems need understanding to attain success in use and design. These causes can be enumerated as follows:

1. Population increases, which creates pressure to look for land, water, etc.
2. Increase in per capita income of developing countries resulting in forest economic commercialization.
3. Development of infrastructure and technology.
4. Increase in demand and suitability to convert forestland for purposes not compatible with sustainability.

5. Destruction of socio-demographic systems.

It is imperative to obtain systematic and consistent ground measurements to complement data from remote land. Whether forest resources are sustainable depends on the balance of human performance in different ecological, economic and social conditions. Also, whether public politics help to sustain forest resources depends on how effectively they influence the motives, capacities and opportunities that determine the general public's performance reasoning.

High bureaucrats make policies despite the unsustainable crisis developing countries are facing, while laymen still live in unhygienic conditions. Due to the lack of necessities, poor villagers are pushed to encroach on natural resources. Also, investors with short-term economic interests often encourage illegal logging.

The Work of Social Scientists

Studies on the traditional use of tropical forests revealed the following experiences:

Success: Management systems were sustainable.

Traditional low technology systems of forest use persisted for many generations.

The hunters' beliefs controlled hunting. Their long-term stability and survival showed that their cultural-ecological system was successful. Other cultural devices reduced the chances of over-hunting. These systems disintegrated with the introduction of new technical and economic systems.

Slash and burn farmers have been blamed for forest destruction, but there are many different systems of resource-use lumped under this single term. For instance, the Lua and Karen people in Thailand are conservative by employing a forest-fallow field rotation system.

Conditions needed for the persistence of this system are described below.

Limiting population growth by controlling the reproduction rate through marriage control. Control of population growth by expelling undesirable people from the village. Organizing control and management of village resources and agreeing on techniques and rationale. The ability to accumulate wealth and motives for clearing more land and avoid production of excess resources. Sanctions on the use of resources should be imposed. Lastly, village boundaries should be secured and marked.

Failure: Recently, traditional self-sustaining management systems have been destroyed.

The above system has deteriorated badly for a number of interrelated reasons including the increase in population within and outside the community, the weakening of village leadership and the introduction of new religions. Buddhism is being substituted for animism, which removes traditional religious sanctions associated with slash and burn farming.

Other factors causing this deterioration are: expansion of new land-use systems and increasing demands for stream water; introduction of new technology, market economy and transportation, enabling the sale of resources and loss of security on village borders. Outsiders, who have political and economic power, thus, depriving local people of workplaces carry out reforestation on fallow swiddens or degraded forests in some tropical countries.

In many tropical highlands, population levels may have surpassed their sustainable limits, as seen by increasing migration. These people are now contributing to the growth of urban centers. The flood of poor rural people into the cities has created a number of problems thought to be unrelated to forest policy.

Altogether, these changes mean that the population has expanded because of reduced death rates, high fertility, people leaving the forest and migration into village territory. Exploitation of forest resources has expanded through commercialization and land use is uncontrollable.

The Role of Social Scientists

Social scientists should be involved with ecological projects.

They should analyze the attitude of the affected population towards the project, so that their opinion can be communicated to the authorities, thus reducing adverse effects.

In-depth studies of the target population may help to create a project where the benefit and necessities are easily understood.

Major development projects should be based on a prior Environmental Impact Assessment (EIA). Such projects change peoples' social and economic conditions and may affect the whole system of social interactions within the area. Therefore, EIA consultancy teams should consist of foresters, biologists and also economists, anthropologists or sociologists.

The present reforestation policy has far-reaching socio-economic effects. Lack of funds has left reforestation programs relying on private sector support. Commercial tree plantations have led to large-scale transactions with small farmers selling to industrial enterprises. This has led to depriving farmers of important supplementary sources of a subsistence-based livelihood.

These issues leave a broad range of activities to social sciences such as land transactions and ownership, the economic impact of commercial reforestation projects and the assessment of demographic and migratory patterns.

If Forestry Departments support the "Community Forestry Approach", then the social scientists' expertise would determine the importance of forests for subsistence-based village economies; design structures for the maintenance and management of forest reserves; devices to prevent encroachment, and education about the economic and social value of finite natural resources.

Where tribal minorities inhabit forests, anthropologist could study their culture. This may enable implementation of appropriate policies and a more sustainable use of forests.

Economists should make macro-economic assessments of ecological damages. The proposition that "Economic development is the priority of developing or newly industrializing countries, while ecological concern is a luxury originating from the Western Hemisphere" is questionable if long-term costs of ecological decay are taken into account. Regular ecological changes would slow down economic growth.

Integrated Activities – A Must for Tropical Forest Management

This description of recent changes can be repeated throughout the tropical world. The result has been rapid deforestation with many downstream environmental and economic consequences. Thailand's tropical forests have largely been destroyed by the production of tropical hardwoods. Thailand now imports teak and dipterocarps, thereby spreading commercialization beyond its borders.

This repeats the pattern experienced earlier in the history of western industrialized countries.

Rural forest policies have been established for urban people. Urban people often view forests as uncivilized places to be extracted for the benefit of city dwellers. To rural people, the forest enhances living conditions. The consequences of resource exploitation for

human welfare have resulted in forest degradation, thus, creating conflict between policy makers and rural people.

Foresters, who played custodial roles and controlled forestland, now share their rights in forest protection. Villagers in the tropics are moving to the forefront of forest conservation. Many villagers learn about soil erosion and community stability, and guard against deforestation in watershed areas. Religious leaders take responsibility for community forestry programs and protection against over-exploitation.

Forest sustainability should be the aim of rural society. Social scientists have proved they understand the pattern of village lives, settlements, farming practices and trade. A larger socio-ecological view is necessary. Development and maintenance of sustainable forestry management systems must gobeyond technology and require the imposition of laws that are often unenforceable. The problems have major social dimensions, including desired goals of forest use, social values and costs.

Integrated activities of social scientists, technologists, foresters and villagers are necessary for sustainable forestry. Social/ community forestry is receiving wide interest.

Policy Response to Forest Land Use

A policy response to forest degradation and socio-economic problems was adopted in the tropics during the 1970's and social

forestry projects were implemented with aims to:

* Halt decreasing agricultural productivity.
* Develop alternative activities for forest land-based utilization.
* Create new employment opportunities and income.

Research Needs: Role of Social Scientists

The traditional forest policy was not attuned to the requirements of social/community forestry. Socio-economic assessments are needed in addition to physical and environmental assessments. Social assessment asks questions of those using forests. Afterall, beneficiaries who are not residents of the forests make many policies.

Economic assessment includes the cost and benefit of extracting forest products, transport, and profit, as well as the cost of ecological replacement. There has been no intention to provide payment for replacement or restoration and there is also a lack of technology available.

The socio-economic assessment would set the basis for intensive policy efforts to devise innovative institutional arrangements, management measures, and land-use technologies. The ultimate goal is sustainable forestry.

The impacts of international response to global concerns, and the prospects for sustainable forest resources will be affected by

different national responses to negotiations of international environmental agreements. Questions that need to be answered are how to secure sustainable forest resources through national response to international regimes. These matters need the involvement of social scientists, as they have potentially important roles to play in developing possible alternative combinations of interest and the consequent scenarios of potential outcomes at international, national and local levels.

Conclusions

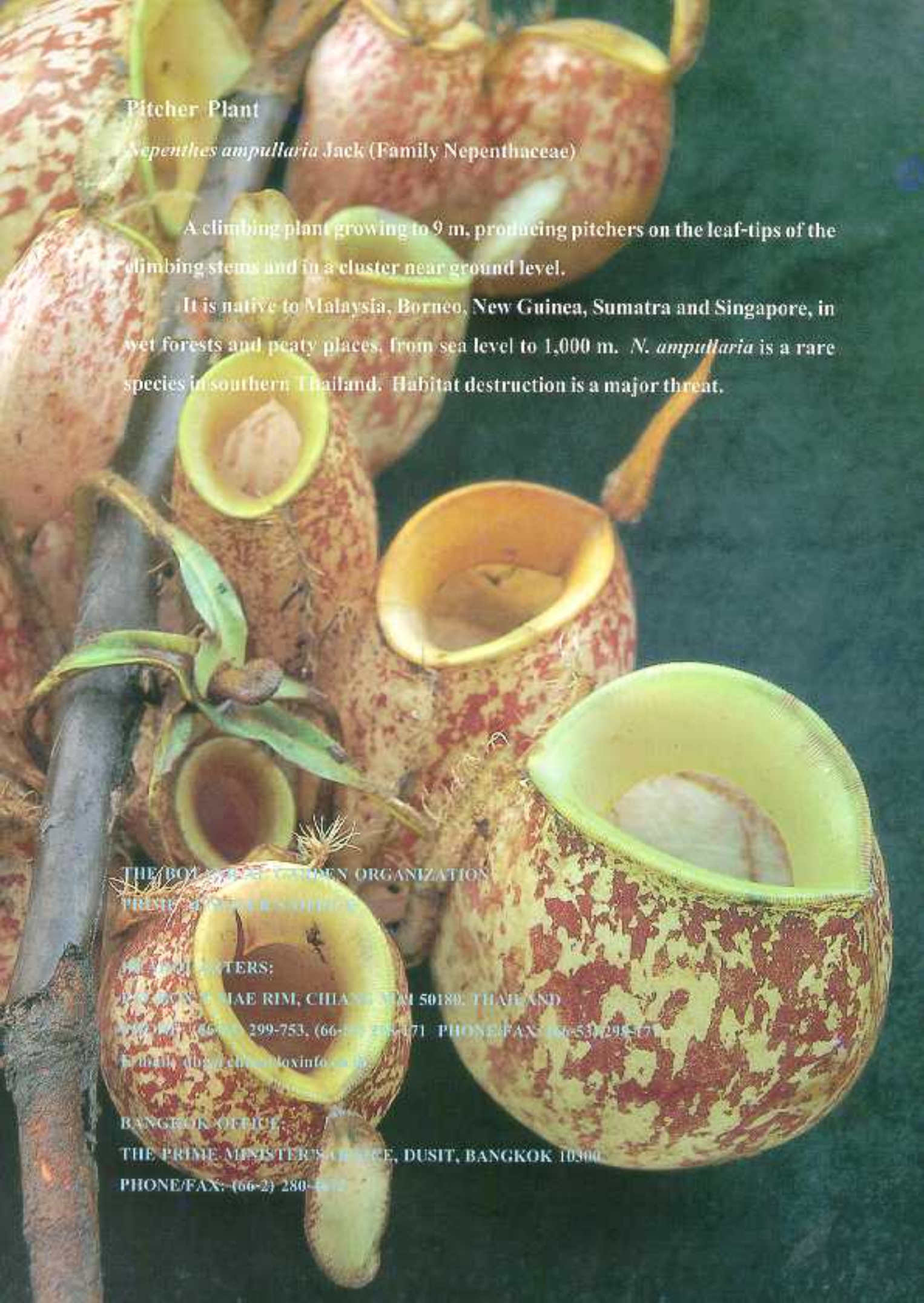
Planners and managers of tropical forests have encountered a series of land use problems. However, the planning and policy formulation has less regard to those who live near the forests. Past records showed distinctive isolation between forestry and local communities. Nevertheless, the present awareness in tropical countries that forestry is an integral part of rural development leaves less ground for biological diversity.

Foresters have performed as custodial agents, while investors exploited forest resources. Public policies have been formulated towards the aim of converting forest areas for a short-term economic return on crops.

The trend towards sustainable forestry needs a review of policy. A role for social sciences towards sustainable development is imminent. It is also imperative that the consciousness of forest conservation must be integrated in all aspects. To meet this objective, it is recommended that forestry curricula include social sciences/forestry subjects. Also, those economic development planners should be oriented in environmental protection, nature conservation and the sustainable use of natural resources.

Such attitudes stem from the fact that forestry is no longer viewed merely as a national resource supplying trade and commerce, but holistic well being and an environmental impact must also be taken into consideration. Sustainable forestry should be the aim at local, regional, national and international levels. It is important that networks are established for social scientists to exchange information on forestry issues and keep pace with developments.

(The above Keynote Address by Dr. Sanga Sabhasri was presented at the XIX IUFRO World Congress Montreal, Canada, 1990. The paper has been edited and shortened by Mr. Robert J. Kimmins, but the changes are minor and the essence of the article has not been altered).



Pitcher Plant

Nepenthes ampullaria Jack (Family Nepenthaceae)

A climbing plant growing to 9 m, producing pitchers on the leaf-tips of the climbing stems and in a cluster near ground level.

It is native to Malaysia, Borneo, New Guinea, Sumatra and Singapore, in wet forests and peaty places, from sea level to 1,000 m. *N. ampullaria* is a rare species in southern Thailand. Habitat destruction is a major threat.

THE BOT[illegible] ORGANIZATION
THE PRIME MINISTER'S OFFICE

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