Conservation of orchids, medicinals, and Agarwood in Vietnam, Laos, Burma, and Cambodia

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Abstract

Very little is known of the state of plant conservation in countries such as Burma, Laos, Vietnam, and Cambodia. This slide presentation is an attempt to provide information on newsworthy joint projects between Botanic Gardens Conservation International (BGCI) and:

1. Hanoi University of Pharmacy and their collaborative work with ethnic Dzao and Cao Lan traditional herbalists to save threatened medicinal species such as *Stephania dielsiana* and *Ardisia gigantifolia* in Bavi National Park
2. Cambodia Ministry of Environment and their efforts to help the O Toch villagers (Bokor National Park) sustain their livelihood through rehabilitating degraded forests after their traditional collecting areas were closed due to construction of a hydroelectric dam.
3. Laos Research Institute of Science and their conservation of threatened Agarwood (*Aquilaria crassna*)
4. Burma Forestry Division in documenting the native orchids of Shan State.

In addition, three public exhibitions on conservation of forestry resources in Laos, Burma and Vietnam are described, as well as commercial farming of *Aquilaria* which poses conservation challenges in these countries.

The slide presentation attempts to provide some positive news regarding conservation as opposed to the commonly heard “doom and gloom” stories in the media. There is a tremendous amount of conservation work to be done in Indo-China but the outlook is cautiously optimistic – there are good local partners and “conservation champions” in these countries who are effecting change for the better.

Keywords

Agarwood, Burma, Cambodia, Collaboration/Partnership, Conservation, Laos, Medicinal plants, Vietnam.

Introduction

Botanic Gardens Conservation International (BGCI) is the world’s leading agency for plant conservation. From 2004 to 2009, I worked as their Southeast Asia Programme Coordinator, based in Indonesia and Singapore. Among the many countries where I worked, four of them – Vietnam, Cambodia, Laos and Burma – stand out as being “under the radar” when it comes to plant conservation. One rarely hears news about plant conservation in these countries, and with this slide presentation I hope to give a brief glimpse of plant conservation projects there.

These projects help to support the Millennium Development Goals. In particular:
Goal 1 – eradication of extreme poverty and hunger
Goal 7 – ensure environmental sustainability
Goal 8 – develop a global partnership for development

Hanoi University of Pharmacy, Vietnam

BGCI has had a relationship with the Hanoi University of Pharmacy (HUP) since the 1990's. Established by the French about 100 years ago, HUP's main remit is to train students in the identification and taxonomy of medicinal plants, research the ethnobotany and cultivation of medicinal plants, and work on their conservation. BGCI's contact there is Dr. Tran Van On, who is on the faculty at the University and director of the campus botanic gardens, which displays and maintains medicinal plants.

Vietnam's first exhibition on medicinal plant conservation was held at the HUP, and involved many stakeholders – academics, researchers, manufacturers of traditional medicines, conservationists, policy makers, schools, and ethnic traditional herbalists. The exhibition relied less on conventional poster panels, and more on living plant displays interpreted and explained by traditional herbalists. For example, along one side of a row of potted plants, herbalist Trieu Thi Thanh from the Dzao hill tribe would explain how her culture uses these plants medicinally, while on the other side of the same row of plants, Cao Lan herbalist Luong Thi Loc would explain her use of these plants, and each culture's use of each species was different.

For the species recovery project, Dr. On, his staff, and the traditional herbalists selected *Stephania dielsiana* (Menispermaceae) and *Ardisia gigantifolia* (Myrsinaceae), two threatened species in Vietnam, and both are listed in the Vietnam Red Book. The former is used as a tranquilizer and to treat rheumatism, while the latter is used for tuberculosis and women's post-partum health. Both are rare in the wild due to overharvesting for medicinal use.

Staff of the Bavi National Park were consulted and included in this project, which resulted in the establishment, at the edge of the National Park, of a conservation collection of *Stephania* and *Ardisia* of documented wild origin. An important component of this collection was the construction of a propagation facility, where the best methods of propagation (seed and cutting) were researched. Cuttings were found to be the best method of propagation, and many hundreds of small propagules were created. Half of these were distributed to the traditional herbalists for planting in their home gardens, and half were planted within the National Park to boost the native populations.

The herbalists living adjacent to Bavi National Park were also taught how to propagate these medicinal plants. Traditionally, these species are grown in their home gardens but in very small numbers. Most of the materials for medicine are harvested from the forest and often from distant and relatively inaccessible hilly locations. The herbalists were delighted to acquire new plants for their gardens because it meant fewer hours of hard trekking to obtain these plants in the wild. And they seldom dig any wild plants to bring home to their gardens because the plants are difficult to transplant from the wild and survival rates are very low.

The ultimate outcome of this project is envisioned to be a "forest farm" where these and other medicinal species are cultivated and made into medicines. Most medicinal species are found in woodland habitat, so this farm would involve forest restoration. This would not only facilitate conservation of rare medicinal species but also provide habitat for many other species of woodland plants and animals. The farm would be a cooperative, owned and operated by the traditional herbalists, who would spend their time cultivating and processing their medicines, rather than trekking into the forests and harvesting from the wild.

Research Institute of Science, Lao PDR

The main goals of the RIS are to:

- Conduct research regarding economically important plants, such as *Aquilaria*, and traditional dye and medicinal plants
- Maintain a laboratory for botanists and researchers

- Conserve rare and endangered flora species
- Support and promote environmental education

Dr. Sourioudong Sundara has been our main contact as director of RIS, and our first project was to conduct an exhibition on the conservation of forest resources. Collaborators included staff and faculty from the departments of Forestry and Biology, National University of Laos, who loaned us live plants and exhibition materials, and who were on hand to explain the exhibits to school children.

The exhibition focused on native orchids, dye plants, and agarwood culture and inducement. One of the most popular parts of the exhibition were informal quizzes conducted at the end of school visits. These were invariably well received with great enthusiasm and delight. Students who gave correct answers were given notebooks and pens.

A brief explanation follows regarding agarwood and how it is produced. Agarwood is the extremely fragrant and valuable resin-infused wood produced by trees of the genus *Aquilaria* (Gratzfeld & Tan, 2008). It is mainly used as incense and perfume. The fragrant resin is produced in response to physical injury and subsequent fungus infestation. Wild trees are now extremely rare because they are indiscriminately felled even though they may not contain any agarwood.

BGCI has assisted RIS to survey and document remaining wild populations of *Aquilaria* in Laos, and produce a database of the wild populations, including voucher specimens. Tissue culture techniques have been used to mass-produce native *Aquilaria* plants for distribution to local farms and growers. The RIS has isolated three varieties of fungus and are working with some local farmers in inoculation trials of these fungi. Holes are drilled into the *Aquilaria* trees using an electric drill. Small wooden plugs inoculated with fungus are then hammered into the holes. Agarwood formation then commences and the agarwood can begin to be harvested after 3-5 years. One of the plantations I visited was owned my Mr. Sieng Sa in Borikamsay Province. He is a strong proponent of conserving and growing only native Lao *Aquilaria*, claiming that plants imported from other neighbouring countries are not as sturdy as local plants, and that local *Aquilaria* produces superior agarwood. The ultimate goal of this project is to conserve native Lao *Aquilaria* and to alleviate poverty by sharing agarwood inducement techniques with rural farmers.

Division of Forestry, Nature and Wildlife Conservation Department, Burma (Myanmar)

The Forestry Division aims to conserve, protect, and manage forests in Burma. My main contacts are Ms. Kyu Kyu Thinn, an orchid specialist, and Mr. Thet Thun, a botanist. I met them when they were working at the National Kandawgyi Gardens located in Pyin Oo Lwin (Maymyo), in the mountains above Mandalay. Ms. Thinn had developed a good collection of native wild orchid species, and Mr. Thet Thun had established a propagation programme to conserve the rarest plant species in the Botanic Gardens.

At the Gardens, we held the nation's first exhibition on forest and nature conservation, targeted at primary and secondary school children. Staff of the Gardens, and of the Nature and Wildlife Conservation Department were on hand to explain the exhibits to visitors, including traditional Burmese herbalist Ms. Khin Myint Oo who showed visitors various medicines and the live plants from which they were made. Other collaborators included Myanmar Timber Enterprise, University of Yangon Botany Department, Myanmar Agricultural Service, and Lao Forest Research Institute, who provided additional materials for the exhibition.

Burma (Myanmar) has an incredible variety of climates and habitats, from the glaciers in the mountainous far north to the deltas of the Ayeryawaddy (Irrawady) River. It therefore is

home to an incredible biodiversity, notably the orchids. However, they are threatened by over-collecting, illegal trade to neighbouring countries, and habitat degradation and loss. Our project with the Nature and Wildlife Conservation Department involved identifying and documenting populations of wild orchids in Shan State, and establishing a living conservation collection of native orchids at the Inle Lake Wetland Wildlife Sanctuary. A shade house was constructed at the Sanctuary Headquarters in Naung Shwe, to house approximately 130 orchid species collected from nine locations within the state. Each of the plants is tagged and the field collection data has been entered into a computerized database. In addition, Ms. Kyu Kyu Thinn has trained the Wildlife Sanctuary staff in orchid taxonomy and identification, collection of field data and plants, and orchid cultivation. Future initiatives include: a conservation education programme for local villagers and orchid hunters, conducting a similar survey for Natmataung National Park in Chin State, and propagation and distribution of orchid plantlets for cultivation by villagers, to promote wider community participation in orchid conservation.

General Department of Administration for Nature Conservation and Protection, Ministry of Environment, Cambodia (GDANCP)

The GDANCP has jurisdiction over the country's national parks, and focuses on documenting and conserving the flora of Cambodia. BGCI had worked previously with Mr. Khou Eanghourt on a number of projects, such as a botanical field techniques training course for GDANCP staff. The current project grew in response to Cambodia's largest hydroelectric dam being constructed within Bokor National Park in southern Cambodia. The villagers of O Toch community, located adjacent to Bokor National Park, rely on harvesting and weaving bamboo and rattan for their subsistence livelihood. Their best bamboo harvesting areas will be flooded by the dam, and these areas are now off-limits due to the dam construction.

The GDANCP, in consultation with village elders of O Toch, came up with a solution that focused on developing a livelihood strategy for O Toch Village, while improving biodiversity conservation through reforestation of a degraded area using bamboo, rattan, and other NTFPs (non-timber forest products). A socio-economic survey was conducted to quantify O Toch's dependence on bamboo, and to identify other potential livelihood activities. Bamboo and rattan harvesting and weaving was overwhelmingly the most important occupation of the villagers. About ninety-five percent of O Toch families produce baskets for sale, and eighty-eight percent who produce baskets report that bamboo resources play a very important role for their livelihood.

A 47.1 hectare CPA (Community Protected Area) was established, consisting of degraded evergreen and semi-evergreen forest, which had been heavily logged in the past. One of the main purposes of the CPA was for the O Toch community itself to participate in natural resource protection and sustainable use. A plant nursery was established at the CPA to facilitate propagation and maintenance of bamboo and rattan. Seeds of *Dipterocarpus*, *Hopea*, and *Aquilaria* have also been germinated as part of the forest rehabilitation effort. A small dam was constructed near the nursery for irrigation during the dry season. Large areas of the CPA are now planted with bamboo, and due to its fast growth, it will provide shade for the establishment of other forest species, especially valuable timber trees which will form the semi-permanent canopy of the rehabilitated forest.

A nucleus of an *Aquilaria* conservation collection has been established at the CPA, with seedlings from at least 4 wild populations in the Bokor National Park area. One location consists of two trees in the compound of a Buddhist temple known as the Ruolos Pagoda. The elderly head abbot has fiercely protected these trees which are at least eighty years old, and indeed, seeds from these trees are much sought after by local agarwood plantation

farmers who claim that local native trees perform much better than those imported from neighbouring countries.

Agarwood plantations are fast cropping up in all countries where *Aquilaria* is native, but there are certain problems associated with the provenance of the seed and saplings. In Cambodia and Laos, almost all plantations consist of trees grown from seed imported from Thailand. It is doubtful that anyone has studied these imported seeds to determine what species is/are being imported, and how these will affect native wild populations. It is feared that if the imported Thai *Aquilaria* are conspecific or closely related to the Cambodian/Lao species, then genes from the Thai plants may "contaminate" native Cambodian/Lao populations, and that these native germplasms will be lost over time.

The urgent needs are to:

- Conduct nation-wide surveys to document and collect germplasm from wild populations,
- Establish living conservation collections of native wild material,
- Determine level of threat from Thai seedlings
- Research inoculation and harvesting methods to determine best sustainable methods.

Conclusion

There is a tremendous amount of conservation work to be done all over the world, but especially in biodiversity rich – resource poor regions such as Southeast Asia, and particularly in countries whose governments may not see the need to protect and sustain their natural resources and the environment.

Finding good collaborators is important for success. I count myself extremely fortunate to have worked with diligent, responsible partners and collaborators, whose vision and broader goals resonate with conservation and sustainable development. I am convinced that for every story of environmental gloom and doom we hear, there must be an equal, if not greater, number of positive success stories of individuals or groups of individuals who are working for the greater good of the planet. Each of the collaborators and partners I've worked with can be considered as "champions for conservation", who give me renewed hope for a healthier, sustainable planet.

References

Gratzfeld, J. and Tan, B. 2008. Agarwood – Saving a Precious and Threatened Resource. BG Journal 5 (2): 27-29