

# **Plant conservation in Malaysia – Meeting the challenges of the twenty first century**

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## **Abstract**

Malaysia has an estimated 15,000 species of vascular plants. It is geographically divided into two halves: Peninsular Malaysia extending from mainland Asia; and the east Malaysian states of Sabah and Sarawak on the island of Borneo. Both these regions have their own distinct floras. Peninsular Malaysia has about 8,300 species of vascular plants while Sabah and Sarawak has an estimated 12,000 species. The rich plant diversity poses many challenges for plant conservation in Malaysia. The Malaysian flora is not completely known. Peninsular Malaysia has a working checklist, for Sabah and Sarawak, an obsolete checklist is available and the list badly requires updating. In the past, plant conservation has not been high on the nation's priority; very few species level conservation activities have been done. However, recent changes in the government have provided opportunities towards a more holistic approach for plant conservation in Malaysia. The Forest Research Institute Malaysia has led a number of important initiatives towards supporting such efforts. A national strategy for plant conservation for Malaysia has been developed; the strategy was developed in a consultative process in response to the Global Strategy for Plant Conservation. A phase approach towards documenting the flora of Malaysia has been adopted. The Tree Flora of Sabah and Sarawak which initiated in 1991 has completed 6 volumes and the project will continue for another estimated ten years. The Flora of Peninsular Malaysia started in 2005, provides a fresh revision of the total flora of West Malaysia. A checklist to enumerate the vascular plants of Borneo has started. On-going plant conservation projects include conservation status assessment and detail population studies of critically endangered plants. With the setting of Kepong Botanic Gardens (KBG), attempts are also been made to bring some of the threatened and rare plants in cultivation at KBG.

## **Introduction**

Malaysia is a small country located between 0° 50'N and 7° 25'N with a land area of about 328,550 km<sup>2</sup>, slightly smaller than Germany. Malaysia is geographically divided into two halves by the South China Sea: Peninsular Malaysia extending from mainland Asia and the east Malaysian states of Sabah and Sarawak on the island of Borneo. For most parts of the country, it has an equatorial climate with little climatic fluctuation throughout the year. Its rainfall is affected by the monsoon rains, receiving 200-300 cm a year in the lowlands, to 300-350 cm a year in the mountains, distributed quite evenly throughout the year with generally two peaks and two troughs. There is generally no distinct dry season except for North West Peninsular Malaysia and North Sabah of about 2-3 months of drier months. Its topography ranges from sea-level to its highest mountain in Sabah, Mount Kinabalu reaching 4,100m and in Peninsular Malaysia, Mount Tahan to 2,188m elevation.

Most major tropical rain forest formations are represented in Malaysia. These are restricted to particular habitats and as is often the case, habitat boundaries are fairly sharp, so are the forest formation boundaries. But where habitats change gradually, so too does the forest from one formation to another. Nine major forest formations are recognised in Malaysia (Whitmore 1988), namely, the lowland evergreen rain forests, heath forest, forest over limestone, beach vegetation, mangrove vegetation, freshwater swamp forests, peat swamp forest, semi-evergreen rain forest and montane rain forests. Within each of these formations, further subtypes are recognised. Malaysia has about 15,000 species of vascular plants. Located in the Malesian region, its affinity is Sundaic; having common elements with Sumatra, Java and Palawan. The two major geographic

regions of Peninsular Malaysia and East Malaysia comprising the states of Sabah and Sarawak on Borneo Island have their own distinct floristic components. Peninsular Malaysia has about 8,300 species of vascular plants while Sabah and Sarawak have an estimated 12,000 species. The rich plant diversity poses many challenges for plant conservation in Malaysia.

## **Flora of Malaysia – What do we know?**

Saw & Chung (2007) have provided a brief historical account of the plant diversity exploration and documentation of Malaysia in the regions of Peninsular Malaysia or Malaya and of the states of Sabah and Sarawak. As they pointed out in the review, the flora of Malaysia is not completely known. There is no comprehensive checklist or revision for the flora of Malaysia. For Peninsular Malaysia, the most comprehensive account for the region is still Ridley's revision from 1922-1925. This account is outdated and very much due for a total revision. However, there have been a number of family or generic or specific group (e.g. trees) level revisions. A revised flora of Malaya was initiated in the early 1950s from Singapore Botanic Gardens, as the knowledge of the Malayan flora improved with more explorations and collections. The project however did not come to completion because of changes in the political environment. Malaya received her independence in 1957 and subsequently the federation of Malaysia was formed in 1963 which included Sabah and Sarawak. When Singapore, ceded from the federation in 1965, Singapore Botanic Gardens with all its periphery botanical activities were also lost from Malaysia (Saw & Chung, 2007). The revised flora of Malaya project was then more or less discontinued having only revised the orchids, grasses and a volume on ferns. In Peninsular Malaysia, the Tree Flora of Malaya was started at the Forest Research Institute, and the project completed the revision of about 2,800 species in 1989 (Ng, 1989) in four volumes. Turner (1997) published a catalogue of vascular plants of Malaya. The catalogue is a checklist of Peninsular Malaysian plants including Singapore from literature.

For Sabah and Sarawak on the island of Borneo, botanical enumeration was poorer. No checklist exists but two compilations were made for Borneo (Merrill, 1921, Masamune, 1942, 1945). Masamune's compilation provided a more critical checklist. Apart from these checklists, more recent accounts for the flora of Borneo were mostly forester's manuals and checklists often on selected groups in the region or states of Brunei, Kalimantan, Sabah and Sarawak (Saw & Chung 2007).

## **Towards the flora of Malaysia and botanical activities at the Forest Research Institute Malaysia**

When the Forest Research Institute Malaysia (FRIM) was formed as a statutory body in 1985 from the former FRI, the scope for its botanical research was also broadened to include the total flora of the country, not just the commercially important plants, e.g. timber, rattans and bamboos. With the completion of the Tree Flora of Malaya, a project to account for the tree flora of Sabah and Sarawak was initiated in 1991 (Saw & Chung 2007). The project has a large number of local and international collaborators, involving contributors from the region, Europe and the United States. Over 25 botanists are involved in the revisions. To date, six volumes have been produced. It is envisaged that it will take another ten years to complete this very rich tree flora of over 4,000 species.

In April 2004, the Ministry of Natural Resources and Environment was formed. With the creation of the ministry, it became of national priority that the government was committed to document the biodiversity of the country. The work of documenting the flora of Malaysia became very quickly a national need and no more an academic wish-list for botanists in Malaysia. For the immediate use, the country requires a checklist of its flora, as Peninsular Malaysia has already a checklist; the immediate need was for Sabah and Sarawak to have an updated list. Under the Ninth Malaysian Plan, a project was prepared just to meet this need.

In realising the flora of Malaysia, a pragmatic approach was taken, first to continue and complete the Tree Flora of Sabah and Sarawak project and examine ways to extend into a full national flora project (Saw and Chung, 2007). In this approach, the flora of Malaysia can be tackled as two regional projects, revisions for

Peninsular Malaysia and for Sabah and Sarawak. In 2005, plans were drawn for a Flora of Peninsular Malaysia project. It was thought that the time was right for the project. The Tree Flora of Sabah and Sarawak has already been running well for about 15 years and Peninsular Malaysia since the Tree Flora of Sabah and Sarawak project started has been relatively neglected. Following the proposal, the Flora of Peninsular Malaysia received funding at the end of 2005 for the next five years. For Sabah and Sarawak, we reckon when the Tree Flora of Sabah and Sarawak project is completed, attempts will be made to start the Flora of Sabah and Sarawak project. A dimension that was slightly different when the Flora of Peninsular Malaysia project was formulated was a strong component on capacity building. This has factored into greater manpower development since project started in 2005. As a result, the Forest Research Institute Malaysia has employed 18 researchers to work on the Flora of Peninsular Malaysia and the Tree Flora of Sabah and Sarawak projects, where the greater majority of the newly appointed staff is involved in the former project. Including our collaborators, the number of researchers involved in both projects will be over 30 researchers. Both projects have also made a collaborative approach towards the revisions, for families revised in both projects; the researchers involved are encouraged to do the extra work so that revisions for both projects can be done simultaneously.

### **Plant conservation projects**

In the past efforts on plant conservation projects or activities were poor. Malaysia is endowed with rich plant resources; in the early 1960s over 75% of the land area was forested. Forest resources then appeared to be inexhaustible. However, land development schemes initiated in the early 1960s into 1980s saw large areas of lowland forests converted to industrial plantation schemes of rubber and oil palm under the FELDA (Federal Land Development Authority). The FELDA scheme has been very successful; it has developed over 853,000 ha as plantations or settlement areas. Today, however, less than 50% of the land area is still forested. Logging of forests was another important economic activity for the country. By the turn of the twentieth century, most of the lowland forests have been logged and logging now reached into the hills and mountains. Outside the protected areas, there is very little virgin forest left in Malaysia. In some forest areas, logging has gone into at two or even three cycles. A further reason why there was lack of interest in plant conservation was there was general lack of information on plant species, population and distribution information. The very rich flora of the country itself became an impediment towards conservation. This information gap makes it difficult to recognise plant conservation issues. Unlike animals which have wider public interest, plants do not attract such interests. Often threatened plants are not at all attractive. Issues of threat are often in the hands of very few botanists.

However, the situation in Malaysia is changing fast. Since 1995 the Forest Research Institute Malaysia has been developing more research projects in a more systematic manner in plant and habitat conservation. Our initial attempts coming from the Botany section of the institute started on conservation projects on specific habitats. Among the first was a study on the impact of highland development in upper Montane forest in Genting Highlands, Pahang. In 1997 a project was initiated to study the conservation effectiveness of virgin jungle reserves (VJR) as conservation areas for production forests. The project has two main components.

- Firstly was to enumerate species capture within the VJR system. The aim was to determine within the network of VJR in the country, what proportion of tree species are found within the VJR.
- Secondly for a limited number of species, a study on genetic variation of populations within the VJR system was made. One main concern using management systems in forest management was the issue of genetic erosion resulting from harvesting of timber. The project was to determine the minimum population size that could capture the genetic variation in species with different breeding systems. The VJR provided the most intact forest areas in the country for such sampling.

In 1997, staff from institute became involved in the conservation status assessment of endemic trees with World Conservation Monitoring Centre. This was the first attempt within the institute to put conservation status categories on Peninsular Malaysian tree species. The results of that effort were published in the World

List of Threatened Trees in 1998 (Oldfield et al., 1998). In 2001 a project was initiated to conduct conservation monitoring of critically endangered (CR) species. The studies involved the re-location of critically endangered species or species assessed to be possibly extinct in the 1998 publication. For those species that were relocated, detail population studies were then conducted. From the study only *Shorea kuantanensis* was not relocated. However, the research team had better luck with *S. lumutensis*, *S. gratissima*, *Dipterocarpus sarawakensis*, *Hopea subalata*, and *H. bilitonensis*. In the process of searching out these threatened species the team was responsible to have discovered a new species which was subsequently named *Vatica yeechongii* Saw (Saw 2002) and two new records; *Dryobalanops beccarii* and *Dipterocarpus tempehes*. Both these latter species previously were only known from Borneo.

In 2005, following the success of the earlier project, a project was drawn up to systematically assess conservation status of all indigenous plant species. In this attempt, the project develops methods to include more distribution information (other than herbarium collection information) than the previous attempt in 1998 publication. In 2005, FRIM organised a workshop to formulate a procedure for assessment of Malaysian plant species using IUCN (2001). The result of the workshop was the publication of a guide to contributors towards threat assessment of Malaysian plants (Chua & Saw 2006). The guide now serves as a template for conservation assessment of all native plants of Malaysia. In filling the taxon data information sheet, it provides a detail record of how each conservation status score was decided. The assessment started with the Dipterocarpaceae and Begoniaceae in 2006 where 100 species were assessed for their conservation status. For this year 2007, it will continue with other species not assessed yet, i.e. other remaining dipterocarps and Palmae. The study on highly endangered species continued together with the conservation assessment of target groups.

The project has started to work out a protocol on how to effectively handle threatened plant species. An important step towards actually conserving threatened species. As a follow up to the conservation assessment, FRIM is now pushing ahead for direct conservation of threatened plant species in Malaysia. A protocol to handle threatened species is being developed and attempts are made to include this protocol in dealing with threatened species in Malaysia.

## Future research

Botanical research at FRIM will continue along the current projects as these projects are long-term commitments which FRIM will endeavour to complete. The Tree Flora of Sabah and Sarawak will take at least another ten years to complete while the Flora of Peninsular Malaysia project will take at least another 20 years for completion. Conservation projects, especially threat assessment and conservation monitoring of threatened taxa, will work in tandem with flora revision projects. This is important because, it is often after the taxonomic problems are sorted out that conservation prioritisation can take place. On the habitat level, development of criteria for the identification of Important Plant Areas (IPA) for Malaysia and guidelines for the establishment of conservation areas for selected flora will also be attempted. Projects on domestication of wild species for ornamental introduction, including plant introduction programmes for *ex-situ* conservation of threatened plant species in the Kepong Botanic Gardens and impacts of ornamental plant trade on some rare forest plants will be other research activities and programmes for the 9<sup>th</sup> Malaysian Plan.

The herbarium at FRIM will continue to grow. The current collection of over 300,000 specimens badly requires addition space to properly curate the specimens. A new herbarium building is currently built under the 9<sup>th</sup> Malaysian Plan. The new building would be able to cater for the present and future needs for at least the next 20 years.

## Global Strategy for Plant Conservation and Malaysia

When the Global Strategy for Plant Conservation (GSPC) was adopted at the Sixth Conference of the Parties of the Convention on Biological Diversity in the Hague of April 2002, it provided a flexible and innovative framework for plant conservation can taken at a higher level. Parties are urged to respond to this initiative. In

2004, FRIM took the initiative to organise a workshop to respond towards our commitment towards GSPC. The Malaysian National Strategy for Plant Conservation is the result of the workshop. In it, while following quite closely to GSPC, there are some modifications towards the Malaysian conditions. Instead of the 16 targets of the GSPC, the Malaysian National Strategy for Plant Conservation has 17 targets. The additional target was for national legislation to meet plant conservation needs of Malaysia. This is an important target as Malaysia does not have laws to protect threatened plant species at a national level. The strategy now provides a holistic approach towards plant conservation in Malaysia.

## Conclusion

The greatest challenge for Malaysia is now implementation of Malaysian National Strategy for Plant Conservation.

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