

# A Preliminary Conservation Assessment of *Nepenthes clipeata* (Nepenthaceae)

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**Abstract:** *Nepenthes clipeata* is endemic to a single isolated granitic massif in West Kalimantan (Borneo). Its rarity and unusual features have given it a high horticultural value, and it has been much sought after by *Nepenthes* collectors, fetching high prices internationally. The population of *N. clipeata* at the type locality has declined severely over the past two decades, and the species is now listed as Critically Endangered by the IUCN. The present study summarizes observations made of *N. clipeata* in West Kalimantan over the past ten years and examines the factors that have contributed to the species' decline. These include a series of forest fires which have destroyed a high percentage of the natural habitat, as well as poaching of plants to supply the horticultural trade. Within the past several years the development of interest in this species locally has dramatically increased plant poaching to clearly unsustainable levels. It is evident that significant conservation measures need to be undertaken if this species is to survive in the wild.

## INTRODUCTION

As one of the rarest and most unusual species in the genus, *Nepenthes clipeata* has always attracted much attention from both botanists and plant collectors. Danser, who published the species in 1928, described it as “one of the most aberrant and striking species of its genus”, and named it after its remarkable nearly orbicular leaves. The unusual morphology of *N. clipeata* and in particular its non-climbing stems, appear to be an adaptation for its habit of growing prostrate on sloping rock surfaces (Fig. 1).

*Nepenthes clipeata* was first collected in 1894 by Johann Hallier on the isolated mountain Gunung Kelam (“Dark Mountain”) (Fig. 2), found in the upper Kapuas river basin near the town of Sintang in West Kalimantan. Although early references to this species describe it as occurring on limestone (Kurata, 1976), Gunung Kelam in fact comprises a single igneous granitic dome, approximately 800 m in height. *Nepenthes clipeata* is found growing on the upper slopes of this

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mountain and is sympatric with *N. albomarginata*, *N. ampullaria*, *N. reinwardtiana*, and *N. rafflesiana* (pers. obs.).

Other granitic outcrops occur in the vicinity of Gunung Kelam, but none are known to exceed 300 m in height and they do not appear to harbor suitable habitat for this species. *Nepenthes clipeata* is also absent from other higher non-granitic mountains in the region, such as Gunung Saran (1700 m) and Bukit Kujau (1400 m) (pers. obs.). Although there remain some areas of the upper Kapuas basin which are still unexplored botanically, existing evidence so far suggests that this species is endemic only to the Gunung Kelam massif.

The extremely limited geographic range of *N. clipeata* makes it highly susceptible to potential threats from habitat loss and collection, and in recent decades this species has seen a rapid and near total decline at Gunung Kelam due to both of these factors. For these reasons *N. clipeata* was classified as Critically Endangered by the IUCN in 2001.

### **IMPACT FROM HABITAT LOSS**

Despite its high annual rainfall, the forests of Borneo are subject to periodic fires, the most catastrophic of which usually coincide with El Niño climatic events. Rocky habitats are particularly susceptible to fire damage due to their rapid drainage (MacKinnon, et. al., 1996).

In 1982 and 1983, widespread fires in Kalimantan, associated with a prolonged drought, destroyed large areas of lowland forest. Although there are no reports specifically of these fires reaching Gunung Kelam, this event appears to coincide with fire damage observed on the mountain in later years. Prior to this fire, plants of *N. clipeata* were readily observed growing on the open rock faces at the upper reaches of the summit trail, as noted both by Hallier in 1894 and other observers in the early 1980's. This fire destroyed most of the forest along flanks of the mountain and wiped out all *N. clipeata* plants along the summit trail.

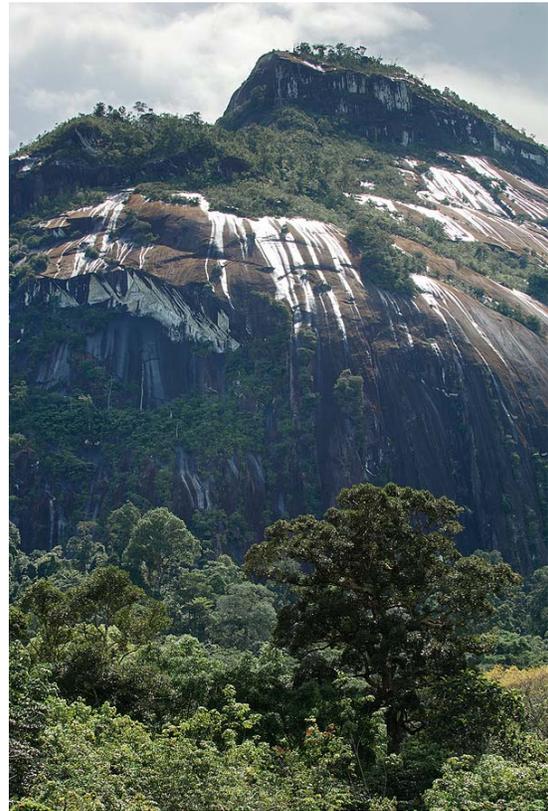
Another El Niño event in 1997 and 1998 with several months of no rain, resulted in fires across the island of Borneo. This time the fires, possibly initiated by campers on the mountain, wiped out the entire summit plateau and eastern flank, destroying most of the remaining intact habitats. In late 1998, a visit to the mountain revealed the devastating extent of the fire damage and the loss of the largest known patch of remaining *N. clipeata* plants. Small numbers of plants still grew in a few remaining pockets of unburned vegetation at the edges of the steep summit cliffs (pers. obs.).

### **IMPACT FROM COLLECTORS**

Although *Nepenthes* have been popular horticultural subjects for well over a century, there are few instances where species have been nearly depleted in the wild solely due to poaching. This is partly due to the fact that the varieties which are most vulnerable (generally montane endemics), occur in remote or inaccessible localities, and also to the difficulties of transporting large quantities of plants overseas.



**Fig. 1.** A large *N. clipeata* plant photographed prior to the 1997-1998 fires. (Photo: C. C. Lee)



**Fig. 2.** Gunung Kelam. (Photo: C. C. Lee)



**Fig. 3.** Habitat for *N. clipeata* showing inaccessibility of terrain. (Photo: C. C. Lee)



**Fig. 4.** Wild-collected plants of *N. clipeata* for sale at a nursery in Pontianak. (Photo: C. C. Lee)

It is unclear exactly when *N. clipeata* first entered horticulture, but judging by the low number of *N. clipeata* plants in cultivation worldwide (and taking into account tissue-cultured plants which became available in the 1990's), it is estimated that there has been a steady, albeit rather slow, loss of plants from Gunung Kelam per year primarily from foreign collectors. The inaccessibility of this locality and the steep rocky cliffs undoubtedly provided some degree of protection for *N. clipeata* (Fig. 3), and indeed there were many reports by visitors in the 1990's who were unsuccessful in finding plants.

Within the past 5 years, a sudden surge of horticultural interest in *Nepenthes* in South-East Asian countries resulted in a huge demand for these plants locally. With a lack of artificially-propagated plants (and difficulties in importing CITES-listed plants from overseas), many traders in Indonesia were only able to supply the market with wild-collected plants. Unhindered by the constraints of traveling or the difficulties of shipping live plants for long distances, local plant poachers were able to obtain huge quantities of *Nepenthes* for very low prices. At one plant fair in Jakarta in 2007 it was estimated that several hundred thousand wild-collected *Nepenthes* plants were available for sale (pers. obs.).

Rumours of a new locality for *N. clipeata* circulated in 2006 when large quantities of this species began to appear on the Indonesian market. In Pontianak, one collector claimed to have traded over 100 kilos of *N. clipeata* plants within the previous year (pers. comm.). By 2007 hundreds of plants were still observable on display at local nurseries and collections in West Kalimantan (Fig. 4), though it was evident that the great majority had been lost due to poor horticultural practices (one grower estimated that over 80% of his *N. clipeata* plants had died after transplanting). Investigations into claims for the source for these plants revealed that all had actually originated from Gunung Kelam, although perhaps from a different spot on the mountain which had somehow escaped both fires and previous surveys. This site now appears to have been exhausted, as despite a continuing high demand for this species, local collectors are no longer able to supply it.

## **PRESENT OUTLOOK AND FUTURE CONSIDERATIONS**

A visit to Gunung Kelam in 2007 confirmed the presence of *N. clipeata* in the most inaccessible slopes of the mountain, though with only a few plants observed it is likely that the species is now hovering on the brink of extinction in the wild (pers. obs.). Even if the remaining number of wild plants comprises a sustainable population, recovery of *N. clipeata* is impossible unless the pressures from plant collectors are alleviated. This can be brought about by strict enforcement measures and by flooding the horticultural market with inexpensive artificially-propagated plants.

Although *in-situ* protection against illegal collection of plants is clearly difficult, discouragement of plant poaching can be implemented in other ways. For example, the authorities of horticultural competitions, which are a frequent event in Indonesia, should make it clear that wild-collected plants will be disqualified. In one plant competition in Banjarmasin in June 2007, all the *Nepenthes* plants entered consisted of wild-collected plants, some of which had apparently dug out from the jungle only days before the event (M. Suska, pers. comm.).

Artificial propagation and the resulting availability of inexpensive plants has proven to be an effective means of reducing the demand for wild-collected plants, as demonstrated in other highly sought-after species such as *N. rajah*. For *N. clipeata* it will be crucial for propagated plants to be widely available on the local market in Indonesia.

If extinction in wild occurs, maintenance of the genetic diversity of this species in cultivation will be of utmost importance. Replanting can only be considered after wild plants of *N. clipeata* can be given protection from collectors. Natural vegetation recovery is evident on the burned areas of Gunung Kelam, although it is not clear if this will be suitable habitat for *N. clipeata*. Natural plants have been observed being rooted in clumps of sphagnum moss and growing under the loose shade of *Leptospermum* trees. Further research into the exact habitat requirements for this species will necessarily preclude any replanting activities.

The *Nepenthes clipeata* Survival Program (NcSP), which was established in 2004 by the International Carnivorous Plant Society, addresses these issues and proposes a series of short-term to long-term actions. These emphasize the importance of ex-situ conservation and encourage the maintenance of a solid population of cultivated *N. clipeata* in horticulture and a database of known clones to enable successful cross-pollination and seed production (Rice, 2004).

It is clear that the continuing survival of this species will require the efforts of multiple parties. Although the large quantities of illegally collected *N. clipeata* in Indonesia represent a huge loss to this species in-situ, they have the potential to dramatically increase the gene pool for an ex-situ propagation program as outlined by the NcSP and effort should be made to include them in a global database. Eventual in-situ work can also benefit from the cooperation of the NcSP and conservation authorities in West Kalimantan.

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