

China: home for the most endangered plants of the world?

J. LÓPEZ-PUJOL

Botanic Institute of Barcelona (CSIC-ICUB), Psg. del Migdia s/n., 08038 Barcelona, Spain

E-mail: jlopez@ibb.csic.es

If you ask to a western botanist: “Which is the world’s most endangered plant species?” he will probably answer the Florida torreyia (*Torreya taxifolia* Arn.), the Wollemi pine (*Wollemia nobilis* W. G. Jones, K. D. Hill & J. M. Allen), or perhaps the Nebrodi fir (*Abies nebrodensis* Mattei), if the interviewed is of European origin. In contrast, if you make the same question to a Chinese (or at least to somebody familiar with the Chinese flora) you may get a quite different reply. Much less known than these emblematic trees, a large handful of Chinese plant taxa is currently in a more critical situation, with just a very few individuals surviving (He, 2009; López-Pujol & Zhang, 2009). A rare cypress (*Cupressus chengiana* S. Y. Hu var. *jiangeensis* (N. Zhao) Silba¹) is arguably the most threatened gymnosperm on Earth because only one individual tree occurs in Longmen (“Dragon’s Gate”) Mountains, in northern Sichuan. The baishanzu fir (*Abies beshanzuensis* M. H. Wu var. *beshanzuensis*¹) from Zhejiang, is not in a much wealthier situation, with only three representatives alive. Moreover, China has also the dubious honour of harbouring some of the surely world’s most endangered angiosperms, such as *Carpinus putoensis* W. C. Cheng (one fenced, old individual is remaining in the wild in Putuo Island, in the East China Sea), *Gleditsia japonica* Miq. var. *velutina* L. Chu Li¹ and *Sinopora hongkongensis* (N. H. Xia, Y. F. Deng & K. L. Yip) J. Li, N. H. Xia &

H. W. Li (with two individuals each one), or *Acer yangbiense* Y. S. Chen & Q. E. Yang (with four representatives). These few conspicuous examples of rare plants, however, may represent just the iceberg’s tip of a flora facing a situation of extreme risk: of the approximately 4200 angiosperm taxa assessed in the first issue of the China Species Red List (which represents just 14% of the angiosperm flora of China), as many as 651 were listed as CR (“critically endangered”) following the 2001 IUCN criteria (Xie & Wang, 2007), that is, in the verge of extinction.

The disproportionate number of extremely threatened plants in China may have resulted from the combination of natural and human-induced factors (López-Pujol & Zhang, 2009). The existence of numerous refuge areas during the Quaternary glacial periods in China (Qian & Ricklefs, 2000; López-Pujol, 2008; López-Pujol & Ren, 2010) yielded a large number of narrow endemics through survival of relict (pre-Quaternary) lineages as well as by differentiation and speciation in these favourable pockets, most of them located in the southern mountainous regions (Fig. 1). The huge destruction and deterioration of ecosystems, largely reported in China during recent decades (e.g. López-Pujol *et al.*, 2006; He, 2009), must have decimated many of these “naturally rare” species, in some cases driving them to the brink of extinction (such as the abovementioned examples) or

¹ It should be noted that in China the term “variety” is generally used to define those entities below the species level (instead of “sub-species”, which is of common use in Europe). See Hamilton & Reichard (1992) for a detailed discussion of this topic.



Figure 1. A view of Hengduan Mountains (SW China), one of the largest refuge areas for plant species in China (López-Pujol, 2008; López-Pujol & Ren, 2010). This mountain range, which spans NW Yunnan, W Sichuan and SE Tibet, is also considered one of the main world's biodiversity hotspots, with a total flora of about 12,000 species, of which *ca.* 3500 are endemic (Myers *et al.*, 2000). It is widely acknowledged that its extremely varied topography, with very large altitudinal gradients (up to 5000 m) supporting a wide array of vegetation zones (from subtropical low mountain evergreen rainforests in the deep valleys to alpine communities on the summits; Chapman & Wang, 2002), have greatly contributed both to the appearance of many new species and to the conservation of relict elements (Chapman & Wang, 2002; Qian, 2002). Unfortunately, despite its inaccessibility, these mountains have been severely affected by human activities, especially logging and overgrazing, which have produced severe erosion (CI, 2007; Morell, 2008), and the remaining primary vegetation may have decreased to a mere 8% of its original extent (Myers *et al.*, 2000). In addition, several dams have been projected in the region, which may produce further environmental damage (CI, 2007). *Acer yangbiense*, probably the most endangered maple of the world, has its unique four individuals located in this mountain range (Gibbs & Chen, 2009). [Photograph: J. López-Pujol]

even producing their extirpation from nature. *Betula halophylla* Ching ex P. C. Li or *Cystoathyrium chinense* Ching, both extinct in recent times (Zhang & Ma, 2008), are just the “newest entries” of a long list of at least 200 plant species disappeared in China from the 1950s (Zhang *et al.*, 2000). Despite the laudable new attitude of Chinese leaders towards environmental protection (*e.g.* Johnson, 2008; Liu & Diamond, 2008) and the launching of several programs for nature conservation in recent years (*e.g.* CSPCEC, 2008; He, 2009; López-Pujol &

Zhang, 2009; Xu *et al.*, 2009), much more effort is still needed in order to prevent further losses in one of the most interesting and valuable floras of the planet (Chapman & Wang, 2002; López-Pujol *et al.*, 2006; CSPCEC, 2008).

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