The IUCN Red List of Threatened Species™
ISSN 2307-8235 (online)
IUCN 2008: T131155456A131155458
Scope: Global
Language: English

Zelkova schneideriana, Schneider's Zelkova

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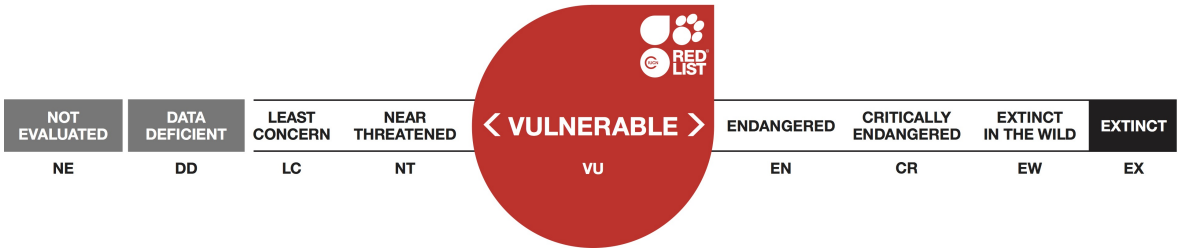

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Citation: Song, Y., Bétrisey, S. & Kozlowski, G. 2018. *Zelkova schneideriana*. The IUCN Red List of Threatened Species 2018: e.T131155456A131155458. http://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T131155456A131155458.en

Taxonomy

Kingdom	Phylum	Class	Order	Family
Plantae	Tracheophyta	Magnoliopsida	Rosales	Ulmaceae

Taxon Name: *Zelkova schneideriana* Hand.-Mazz.

Common Name(s):

- English: Schneider's Zelkova

Taxonomic Source(s):

Board of Trustees, RBG Kew. 2018. Plants of the World Online Portal. Richmond, UK Available at: http://www.plantsoftheworldonline.org.

Taxonomic Notes:

Recent genetic studies showed that the population from Taiwan, previously determined as *Zelkova serrata* var. *tarokoensis* is not valid anymore and should be considered as *Z. schneideriana* (Naciri *et al.* submitted).

Assessment Information

Red List Category & Criteria: Vulnerable A2c; C2a(i) ver 3.1

Year Published: 2018

Date Assessed: June 19, 2018

Justification:

Zelkova schneideriana has a large distribution range in the mountainous regions of China, where the species grows in isolated and small stands in ravines and steep slopes near rivers. The area of occupancy (AOO) is low and estimated to be around 560 km^2, but does not fit the supplementary conditions for a threatened category under criterion B. The total number of subpopulations is estimated to be between 142 and 180. This imprecision is due to the scarcity of field expeditions and frequent errors in species identification. Primary forest decline in China has been very important in the past due to the conversion of forests to agricultural lands and overexploitation of forest resources. Destruction of the primary forests within the extent of occurrence (EOO) of the species and direct damages to subpopulations of *Z. schneideriana* have been reported in various locations throughout its range. We suspect that the population reduction reaches at least 30 % over the last 180 years (three generations) and that large parts of its habitat have been irreversibly destroyed or altered. Therefore, it is assessed as Vulnerable A2c. The species is still declining and the remaining subpopulations are fragmented and are facing further habitat deterioration. Illegal logging has greatly decreased during the past decade but still exists and presents a serious threat to small subpopulations remaining in the southern part of China. We estimate the total number of mature individuals to be less than 10,000 throughout the whole distribution range of the species, with subpopulations not exceeding 1,000 mature individuals. We project a continuing decline of the *Z. schneideriana* population in the future, which falls within the threshold for Vulnerable under Criterion C2(i).

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Geographic Range

Range Description:

Zelkova schneideriana has a wide distributional range in China and is present in 16 provinces: Anhui, Fujian, Gansu, Hubei, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanxi, Yunnan and Zheijiang. The presence of the species in Xizang at 2,800 m asl is very unlikely and probably results from a misindentification, according to specimen in the Chinese Virtual Herbarium (CVH 2018). The species grows almost exclusively in Mainland China with the exception of the island of Taiwan, Province of China, with a large distribution from the mountainous region of Yunnan to the lowlands adjacent to the East China Sea (Fang *et al.* 2011; Zheng and Raven 2003; Chinese Virtual Herbarium (CVH) 2018). A few restricted subpopulations are located on the island of Taiwan. Planted individuals can be found outside its distributional area, as the species is an important ornamental tree in China. It has an estimated extent of occurrence (EOO) of 1,838,435 km^2, while the area of occupancy (AOO) is low and estimated to be around 560 km^2.

Country Occurrence:

Native: China (Anhui, Fujian, Gansu, Guangdong, Guangxi, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Shaanxi, Shanghai, Shanxi, Yunnan, Zhejiang); Taiwan, Province of China

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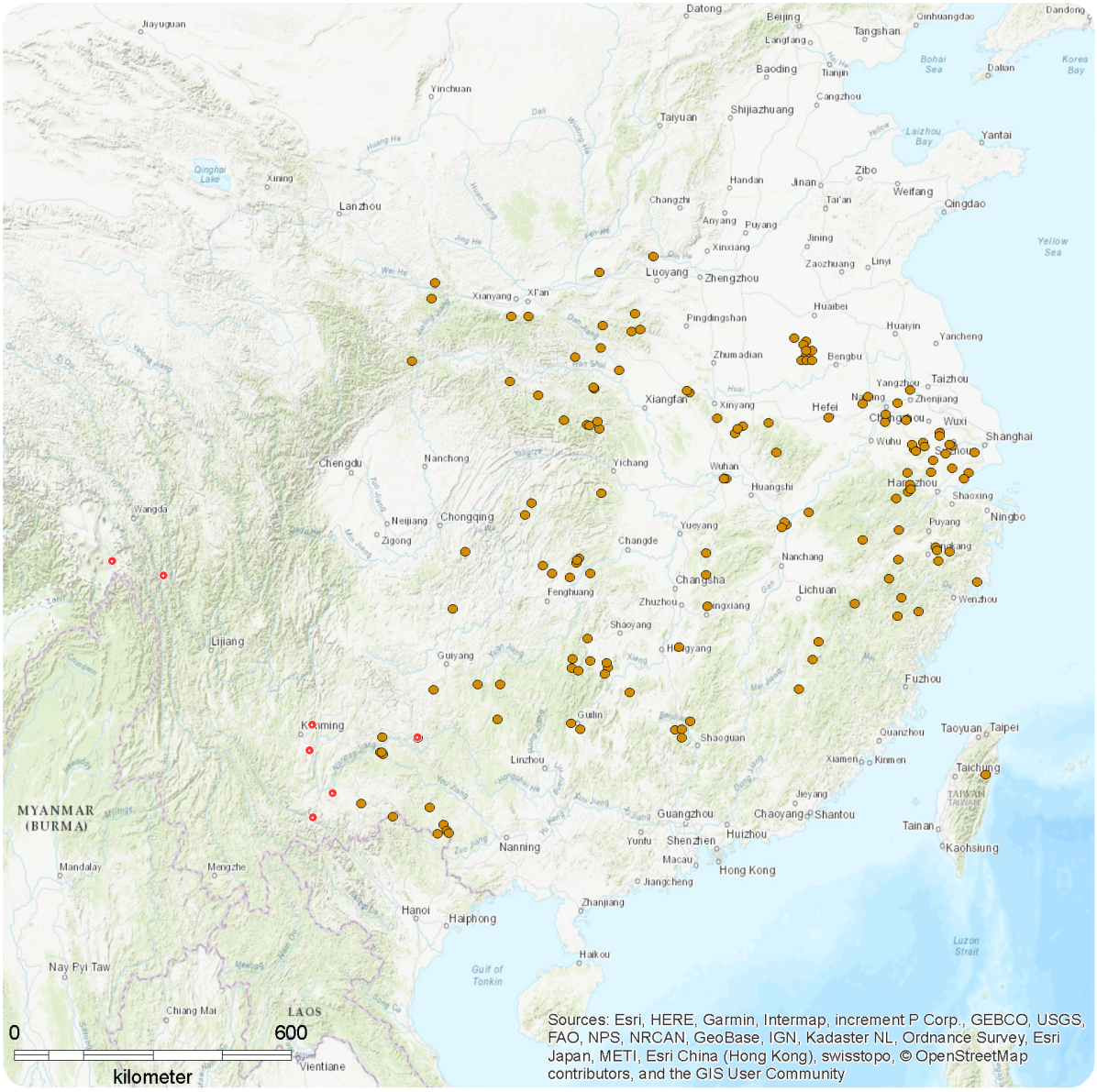
Distribution Map

Zelkova schneideriana



Range

- Extant (resident)
- Possibly Extinct

Compiled by:

BGCI

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

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Population

The total population of *Zelkova schneideriana* is estimated to be between 3,000 to 5,000 mature trees in at least 142 known localities. The exact number of localities is difficult to evaluate because a large part of its distribution range has not yet been fully explored. Moreover, misidentifications with other species of *Zelkova* or *Ulmus* sp. are common. The generation rate of *Z. schneideriana* seems to be very low in its natural habitat. In many localities, no young trees or seedlings were encountered and the total number of individuals is often less than 15 for an entire subpopulation (never over 1,000 mature individuals). The small number of individuals in each stand is particularly frequent in the south and southwestern parts of China (Fujian, Jiangxi, Guangdong, Guangxi, Yunnan, Guizhou), where a single hundred-year-old individual could represent a past larger subpopulation. In the southern part of the country and especially in mountainous rural areas, several majestic trees (including *Z. schneideriana* and *Z. serrata* individuals) are considered sacred by local people, which has allowed their conservation until the present day. Subpopulations are often included in protected areas, such as in the Dabieshan Mountains, Qin Mountains and on Taiwan.

Up until the 1980s, *Z. schneideriana* communities were drastically reduced because of heavy deforestation, such as around the Dabieshan Mountains (Fang 2007) or in Zheijiang Province (Wang and Zhu 1997). The deforestation and conversion to plantation forests have often reached the core perimeter of protected areas. The effect of the past logging has been dramatic for some small stands composed of a few solitary old individuals, especially in the southern part of the distribution range of the species. During the last 10 years, Chinese authorities have begun to pay more attention to protect this species and take legal action against illegal logging in Yunnan and Guizhou Provinces. Since 1999, the species is legally protected and illegal logging has diminished (Fang 2007), but still exists even in the perimeter of protected areas were *Z. schneideriana* represents a source of fire wood. Based on information affecting directly the population numbers and its extent of occurrence (EOO), it is suspected that the reduction reached 30% to 35% over the last 180 years (three generations), with an important degradation of the habitat quality. Historical threats, which were largely caused by human activities (deforestation and commercial unmanaged logging), have decreased since the 1980s and are now replaced in the remaining, fragmented stands by threats such as poor habitat quality or the spread of invasive or plantation species (Fang *et al*. 2005). Conversion of primary forests is still affecting the range of the species, leading to an important fragmentation of the stands with a decrease in habitat quality The actual high fragmentation of stands is also particularly problematic when associated with low regeneration and high mortality rates of young trees (Cheng 2009). This could even represent a threat to the long-term survival of some subpopulations (Fang *et al.* 2005).

Current Population Trend: Decreasing

Habitat and Ecology **(see Appendix for additional information)**

Zelkova schneideriana grows typically in ravines along streams and small rivers between 200 and 1,100 (–2,200) m asl. The species is an element of temperate to subtropical forest communities dominated by deciduous trees and intermixed with evergreen species. *Zelkova schneideriana* grows on fertile, slightly acidic to calcareous soils. However, it can tolerate saline and alkaline conditions. It grows up to a height of 35 m and a diameter of 80 cm (Kozlowski and Gratzfeld 2003, Zheng and Raven 2003).

Systems: Terrestrial

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Use and Trade

The wood of *Zelkova* spp. (*Z. serrata, Z. schneideriana* and *Z. sinica*) is heavy, hard and resistant to decay and its reddish colour is very attractive and sought in Asian markets. The wood of *Z. schneideriana* is very expensive and used in construction and furniture industries (Cao *et al.* 2005, Kozlowski and Gratzfeld 2013). Large trees have been cut systematically in most of the species' range since the 1950s for commercial use. It is a high quality timber resistant to decay, and the bark fibre is used for manufacturing ropes and paper (Zheng and Raven 2003). The species is also an important landscape tree because of its large crown and the colours of its leaves in autumn (Cao *et al.* 2005).

Threats (see Appendix for additional information)

The most important threats to *Z. schneideriana* are habitat loss, resulting from agricultural and urban expansion, and the conversion of primary forests to plantation forests (e.g. bamboo, poplar, *Eucalyptus*) (Kozlowski and Gratzfeld 2013). In China, the loss of primary forest was very important from 1700 to the 1980s, with a mean decline of more than 50%, mainly caused by the increase in the human population and subsequent demand for agricultural land (Miao *et al.* 2013, Houghton and Hackler 2003). The loss of primary forests affected the whole Chinese territory and was particularly intense in the southern and central parts of the country (Miao *et al.* 2013, Houghton and Hackler 2003).

Conservation Actions (see Appendix for additional information)

Zelkova schneideriana has been evaluated as Near Threatened in the China Plant Red Data Book (Li-Kuo and Jian-Ming 1992) and is listed as Grade II by the 1999 State Council of China list of National Key Protected Wild Plants.

Zelkova schneideriana has an important value as an ornamental and landscape tree in the Chinese culture (Ru *et al.* 2007). Afforestation could play a major role in preserving the decline of natural subpopulations (Wang and Zu 1997). An international research project at the genus level has been led by the University of Fribourg, Switzerland (Project Zelkova, www.zelkova.ch): both genetic and environmental factors have been investigated to allow a better conservation of the genus worldwide (Kozlowski and Gratzfeld 2013). The species is recorded in 44 global *ex situ* collections within botanic gardens, with only 10 collections based on wild sourced material and 10 collections located in China (Kozlowski *et al.* 2012).

Further investigations are necessary to estimate more precisely the total number of individuals and subpopulations. It is urgent to start monitoring the most vulnerable subpopulations based on expanding threats along the whole range of the species. The small number of individuals in each subpopulation and the lack of juveniles is particularly of concern for a large majority of subpopulations. Monitoring and further investigations could help find answers to the long-term survival of small stands with a few individuals. Afforestation projects using this species could be effective, but special attention should be paid to the use of local varieties to conserve the genetic diversity of the species. *Ex situ* collections should be enhanced in the different regions of China where the species occurs. Priority sites for *ex situ* conservation should be selected based on the low number of individuals and their genetic isolation.

Credits

Assessor(s): Song, Y., Bétrisey, S. & Kozlowski, G.

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Reviewer(s): Gratzfeld, J.

Facilitators(s) and Compiler(s): Rivers, M.C.

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External Resources

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Appendix

Habitats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Habitat	Season	Suitability	Major Importance?
1. Forest -> 1.4. Forest - Temperate	-	Suitable	-

Threats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.2. Small-holder farming	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.2. Wood & pulp plantations -> 2.2.2. Agro-industry plantations	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
4. Transportation & service corridors -> 4.1. Roads & railroads	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		
5. Biological resource use -> 5.3. Logging & wood harvesting -> 5.3.2. Intentional use: (large scale) [harvest]	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		

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Conservation Actions in Place

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Actions in Place
In-Place Species Management
Subject to ex-situ conservation: Yes

Conservation Actions Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Actions Needed
1. Land/water protection -> 1.1. Site/area protection
2. Land/water management -> 2.1. Site/area management
3. Species management -> 3.4. Ex-situ conservation -> 3.4.2. Genome resource bank
4. Education & awareness -> 4.2. Training

Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
3. Monitoring -> 3.1. Population trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km²): 560
Estimated extent of occurrence (EOO) (km²): 1838435
Continuing decline in extent of occurrence (EOO): Yes
Lower elevation limit (m): 200
Upper elevation limit (m): 2200
Population
Number of mature individuals: 3000-5000
Continuing decline of mature individuals: Yes
All individuals in one subpopulation: No

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Habitats and Ecology
Generation Length (years): 60

The IUCN Red List Partnership

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The IUCN Red List Partners are: Arizona State University; BirdLife International; Botanic Gardens Conservation International; Conservation International; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.