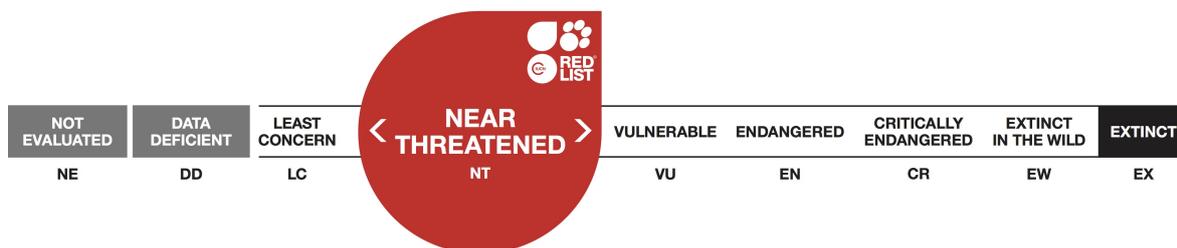




Zelkova serrata, Japanese Zelkova

Assessment by: Bétrisey, S., Song, Y. & Kozłowski, G.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Plantae	Tracheophyta	Magnoliopsida	Rosales	Ulmaceae

Taxon Name: *Zelkova serrata* (Thunb.) Makino

Synonym(s):

- *Corchorus serratus* Thunb.

Common Name(s):

- English: Japanese 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 subpopulation from Taiwan, previously determined as *Z. serrata* var. *taroensis* is not valid anymore and should be considered as *Z. schneideriana* (Naciri *et al.* submitted).

Assessment Information

Red List Category & Criteria: Near Threatened [ver 3.1](#)

Year Published: 2018

Date Assessed: June 19, 2018

Justification:

Zelkova serrata exhibits a large distribution range in Japan, China, the Republic of Korea and the Democratic People's Republic of Korea. However, its actual presence in the Democratic People's Republic of Korea needs to be confirmed. The species is an important element of temperate forests and riparian habitats in Japan and has been planted on a large scale in cities and forests across the country. In contrast, the species is very rare and isolated in China and across the Korean Peninsula. The estimated area of occupancy (AOO) is 900 km² and there is a continuing decline in its habitat quality and in the extent of occurrence (EOO), especially in the southeastern part of its distribution in China. Despite the strong isolation and fragmentation of its population in China and in the Korean Peninsula, the distribution of the species cannot be considered as severely fragmented as it does not fit all the conditions to be considered as threatened under category B. For these reasons, the species has been assessed as Near Threatened. Nevertheless, the species is under heavy threats outside Japan and its conservation should be a priority in China and in the Korean Peninsula.

Geographic Range

Range Description:

Natural subpopulations of *Zelkova serrata* are reported from Japan, China, the Democratic People's Republic of Korea and the Republic of Korea. In Japan, the species occurs from southern Kyushu Island (Kagoshima) through Shikoku Island to the extreme north of Honshu Island (Aomori) (Kozłowski and Gratzfeld 2013). In China, the species is reported from 15 Provinces: Anhui, Fujian, Gansu, Guangdong, Guizhou, Henan, Hubei, Hunan, Jiangsu, Jiangxi, Liaoning, Shaanxi, Shandong, Sichuan and Zhejiang (Fang *et al.* 2011, Zheng and Raven 2003). However, the distribution of the species has probably been overestimated in China due to frequent misidentifications of Asian species of *Zelkova*. Identification errors have been noted in herbarium sheets available online (CVH 2018) and the species is probably not present in Fujian, Gansu, Hunan and Sichuan. A few restricted subpopulations are known from the Republic of Korea (South Korea), where the species is mostly restricted to the vicinity of temples and sacred sites. The situation in the Democratic People's Republic of Korea (North Korea) is unknown, but subpopulations presumably still exist at least in the southeastern part of the country. The species has been largely planted in Japan and in the Republic of Korea (South Korea), which makes the identification of natural subpopulations difficult. Subpopulations reported from the Kuril Islands (Russia) have been planted. The species has an estimated extent of occurrence (EOO) of 3,650,000 km² and the estimated area of occupancy (AOO) is 900 km².

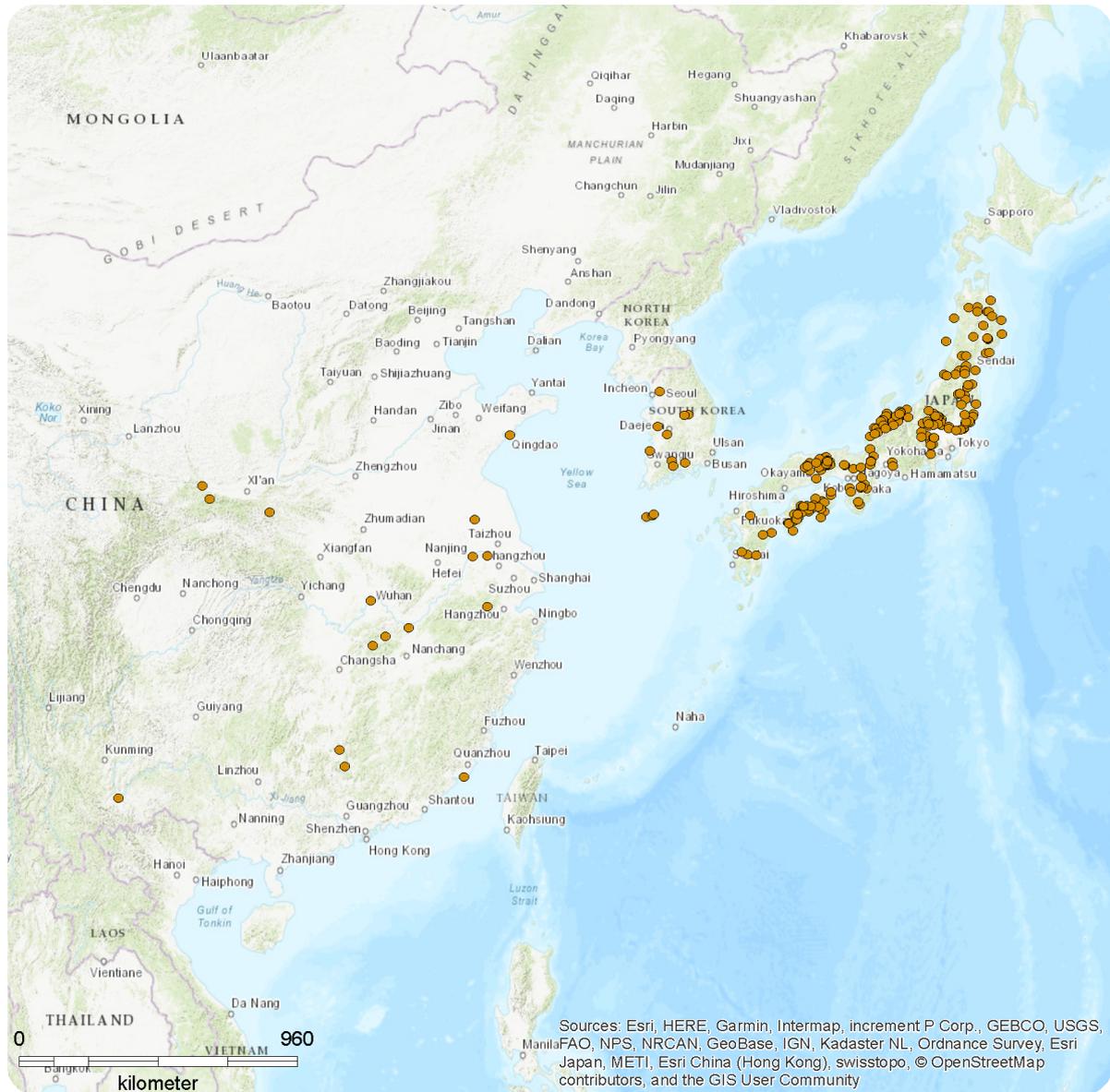
Country Occurrence:

Native: China (Anhui, Guangdong, Guizhou, Henan, Hubei, Jiangsu, Jiangxi, Shaanxi, Zhejiang); Japan; Korea, Democratic People's Republic of; Korea, Republic of

Introduced: Russian Federation (Central Asian Russia, Kuril Is.)

Distribution Map

Zelkova serrata



Range

- Extant (resident)

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.



Population

The total number of individuals and natural subpopulations of *Z. serrata* are difficult to estimate because of lack of investigation and information available. However, the total number of individuals probably exceeds 10,000 known from at least 300 subpopulations, the majority of which are located in Japan. *Zelkova serrata* is distributed widely in Japan, but natural subpopulations remain preserved to the present day only in remote and inaccessible areas (Kozłowski and Gratzfeld 2013). In Japan and the Republic of Korea (South Korea), the species has been planted in parks, city avenues and around sites of interest. In Japan, the species was planted in mountainous regions for timber production after the 19th century (Fukatsu *et al.* 2012). No recent information is available about the presence of the species from the Democratic People's Republic of Korea (North Korea). In China, the distribution of the species probably has been overestimated due to misidentification. Little information is generally available about the natural regeneration of the species, but large stands with hundreds of individuals and the presence of young trees and seedlings can be found in Japan. In China, the species is very rare and subpopulations are usually constituted of fewer than 20 individuals, with no seedlings or young trees. It is quite frequent that a few solitary individuals, considered as sacred by local people, have been preserved in villages, especially in the southern part of the range (Yunnan and Guizhou Provinces). In the Republic of Korea (South Korea), only few stands have been preserved in the vicinity of sacred sites and temples.

Current Population Trend: Unknown

Habitat and Ecology (see Appendix for additional information)

Zelkova serrata grows mostly in ravines and along rivers and streams between 500 and 2,000 m asl. The species favours a mild climate and grows particularly well in limestone valleys on rich, moist soils. It can also develop in drier environments and poorer soil conditions (Kozłowski and Gratzfeld 2003). The species grows in temperate, riparian forest communities, with other plant communities that vary depending on the country and regions where it occurs. In China for example, *Z. serrata* typically co-occurs in montane mixed evergreen and deciduous broad-leaved forests alongside a great diversity of different plant groups, for instance Fagaceae (*Castanopsis* spp., *Cyclobalanopsis* spp., *Lithocarpus* spp., *Fagus* spp.) (Hong and Blackmore 2013). In Japan, the species is one of the major components of temperate forests (Fukatsu *et al.* 2012).

Systems: Terrestrial

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 for in Asia. The wood of *Z. serrata* is very popular and expensive in Japan, and is used in construction and furniture industries (Kozłowski and Gratzfeld 2013). Because of its large crown providing shade and the colours of its leaves during autumn (Kozłowski and Gratzfeld 2013), the tree is also one of the most important landscape species in Japan and in the Republic of Korea (South Korea). The species medicinal uses are being further investigated given the recent discovery of relevant chemical compounds present in twig extracts (Kang and Jang 2012).

Threats (see Appendix for additional information)

Main threats to the species include habitat loss due to agricultural expansion and urbanization,

conversion of natural forests to plantations and uncontrolled commercial logging (Kozłowski and Gratzfeld 2013). The situation varies considerably between the countries in which the species occurs. In Japan, it has been planted extensively around shrines, habitations and in mountainous regions for the production of timber since the beginning of the 20th century (Fukatsu *et al.* 2012). Natural subpopulations exist nowadays only in remote and inaccessible areas, while the broadleaved forests in which the species naturally occurred had been largely replaced by monocultures of *Cryptomeria japonica*, *Larix leptolepis* or *Chamaecyparis obtusa* by the middle of the 20th century (Kozłowski and Gratzfeld 2013). Plant material sources in plantations are often of unknown origin and the genetic diversity of the plantations is generally very low (Fukatsu *et al.* 2012). In China, the species is very rare and subpopulations are often very small, with less than 20 individuals and a low regeneration or even a lack of young trees or seedlings. In the southern part of its range, subpopulations are sometimes composed of individual hundred-year-old trees spared from cutting. Due to the high value of its wood, most of the remaining large and old trees have been cut for commercial reasons from the 1950s to the beginning of the 21st century. Today, the last individuals present in villages in the south of China are often under protection. Conversion of natural forests to plantations or agricultural lands is still a threat in China, especially in the southern part of the country. In the Korean Peninsula, the last remaining individuals grow around temples and sacred sites. There is a lack of recent information about the state of the subpopulations in the Democratic People's Republic of Korea (North Korea).

Conservation Actions (see Appendix for additional information)

Zelkova serrata has not been evaluated in the China Plant Red Data Book (Li-Kuo and Jian-Ming 1992) and is not included in the 1999 State Council of China List of National Key Protected Wild Plants. The species has also not been assessed in the Republic of Korea (Chang *et al.* 2014). *Zelkova serrata* is not listed as threatened in the 2012 Red Data List (plants) edited by the Japanese Ministry of Environment nor in the Red Data Book of the Democratic People's Republic of Korea (DPR 2005).

An important part of the few remaining subpopulations in China and in the Republic of Korea (South Korea) are located inside protected areas or around sacred and religious sites. *In situ* conservation efforts should be implemented to conserve the most vulnerable and fragmented subpopulations in the periphery of the range of the species. Regular monitoring and thorough investigations should be made for subpopulations in China and across the Korean Peninsula. Concerning the more numerous subpopulations in Japan, it would be important to identify old natural stands and place them under protection. Precise data on the abundance and state of the species in the wild are needed. An international research project at genus level had been led by the University of Fribourg (Project Zelkova, www.zelkova.ch); both, genetic and environmental factors were investigated to allow a better conservation of the genus worldwide (Kozłowski and Gratzfeld 2013).

Zelkova serrata is one of the most important ornamental and landscape trees in Japan and is planted extensively in forests, cities and villages. Unfortunately, the genetic diversity of these trees is often very low (Fukatsu *et al.* 2012) and plant material source is generally unknown and comprises fast-growing cultivars that are bred mostly for the quality of timber (Kozłowski and Gratzfeld 2013). It would be important to start managing these plantations in order to maintain local genotypes and to insure a high diversity of the planted trees. The species is recorded in 110 global *ex situ* collections within botanic gardens, with only 22 collections from wild sourced material, while 12 collections are found in their countries of origin (Kozłowski *et al.* 2012).

Credits

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

Reviewer(s): Gratzfeld, J.

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

Bibliography

Chang, C.-S., Kim, H., Sungwon, S. and Chang, K.S. 2014. *The Red List of Selected Vascular Plants in Korea*. Korea.

CVH (Chinese Virtual Herbarium). 2018. Chinese Virtual Herbarium. Available at: <http://www.cvh.org.cn/en>. (Accessed: 2018).

efloras. 2014. Flora of China. Available at: http://www.efloras.org/flora_page.aspx?flora_id=2. (Accessed: 2014).

Fang, J., Wang, Z. and Tang, Z. 2011. *Atlas of Woody Plants in China: Distribution and Climate, Volume 1*. Springer.

Fukatsu, E., Watanabe, A., Nakada, R., Isoda, K., Horao, T., Ubukata, M., Koyama, Y., Kodani, J., Saito, M., Miyamoto, N. and Takahashi, M. 2012. Phylogeographical structure in *Zelkova serrata* in Japan and phylogeny in the genus *Zelkova* using the polymorphisms of chloroplast DNA. *Conservation Genetics* 13: 1109-1118.

Hong, D.-Y. and Blackmore, S. 2013. *The Plants of China*. Cambridge University Press, Cambridge.

IUCN. 2018. The IUCN Red List of Threatened Species. Version 2018-2. Available at: www.iucnredlist.org. (Accessed: 15 November 2018).

Japanese Ministry of Environment. 2012. Red Data List (plants). Available at: http://www.biodic.go.jp/rdb/rl2012/redList2012_ikansoku.csv. (Accessed: 2015).

Kang, H. and Jang, Y. 2012. Selective apoptotic effect of *Zelkova serrata* twig extract on mouth epidermoid carcinoma through p53 activation. *International Journal of Oral Science* 4: 78-84.

Kozłowski, G. and Gratzfeld, J. 2013. *Zelkova* – an ancient tree. Global status and conservation action. Natural History Museum, Fribourg.

Kozłowski, G., Gibbs, D., Fun, H., Frey, D. and Gratzfeld, J. 2012a. Conservation of threatened relict trees through living *ex situ* collections: lessons from the global survey of the genus *Zelkova* (Ulmaceae). *Biodiversity and Conservation* 21: 671-685.

Li-kuo, F. and Jian-ming, J. 1992. *China Plant Red Data Book – Rare and Endangered Plants 1*. Science Press, Beijing.

Naciri, Y., Christe, C., Bétrisey, S., Song, Y., Min, D., Garfi, G. and Kozłowski G. Submitted. Species delimitation in the East Asian species of the relict tree genus *Zelkova* (Ulmaceae): a story of demographic expansions and hybridization.

Ung-Chil, R., Hyong-Son, P., Il-Yob, J., Jong-Sam, R., In-Gi, K., Man-Su, J., Se-Bong, O., Chol-Gyu, K., Kyong-Chol, S., Son-Taek, J., Mu-Gwang, J., Yong-Ho, P., Myong-Hwa, R., Sun-Hwa, K., Kun-Ok, R., Mun-Song, K., Chol-Nam, Y., Chol, J. and Se-Un, P. 2005. *Red Data Book of DPR Korea (Plant)*. MAB National Committee of DPR Korea, Botanical Institute, Biological Branch, Academy of Sciences, Pyongyang.

Zheng, Y.W. and Raven, P.H. 2003. *Zelkova*. Flora of China. Vol. 5. Ulmaceae – Basellaceae. Missouri Botanical Garden Press, St. Louis.

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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		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.2. Small-holder farming	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 -> 2.2. Wood & pulp plantations -> 2.2.2. Agro-industry plantations	Ongoing	Majority (50-90%)	Very rapid declines	High impact: 8
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
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%)	Very rapid declines	High impact: 8
	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		
6. Human intrusions & disturbance -> 6.2. War, civil unrest & military exercises	Past, unlikely to return	Minority (50%)	Unknown	Past impact
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		

Conservation Actions in Place

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

Conservation Actions in Place
In-Place Land/Water Protection and Management
Occur in at least one PA: Yes
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
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level

Research Needed

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

Research Needed
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.2. Harvest level trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km ²): 900
Estimated extent of occurrence (EOO) (km ²): 3650000
Continuing decline in extent of occurrence (EOO): Yes
Lower elevation limit (m): 500
Upper elevation limit (m): 2000

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