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The creation of the longest tree avenue in the world

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Landscape architecture practice, Weddle Landscape Design, has discovered the longest tree avenue in the world in the Chinese city of Pizhou. This is an avenue of Dawn Redwood (*Metasequoia glyptostroboides*) 47-km long. This paper summarises the discovery of Dawn Redwood (*M. glyptostroboides*), the “living fossil” tree, and introduces this world record avenue to the international arboricultural community.

Keywords: tree avenue; Dawn Redwood; *Metasequoia glyptostroboides*; world’s longest tree avenue

Introduction: Pizhou Green Spaces Masterplan

Weddle Landscape Design is working on a Green Spaces Masterplan for the expanding city of Pizhou in China. Their role is to create a green infrastructure system which connects between 50 new parks 100 km of river and canals and 200 km of tree-lined streets. The city will double in size over the next 20 years.

It was during his first site visit that Mike Browell saw the Picang Highway, stretching far into the distance. It was flanked on each side with a seemingly endless line of Dawn Redwood (*Metasequoia glyptostroboides*). From the perspective of Western scientists, he had discovered the longest avenue in the world (Figure 1).

At the initial briefing, the Mayor asked Weddle Landscape Design to assess their existing landscape and to advise on any special features, which needed protection during city development. Weddle Landscape Design carried out a Landscape and Visual Character Assessment and identified three key components of the local landscape character:

- (1) Pizhou is an ancient port city on the 2500-year-old Grand Canal, the longest man-made waterway in the world with 1775-km length.
- (2) The city has the longest tree avenue in the world, an avenue of Dawn Redwood 47-km long.
- (3) Pizhou has over 5 million Dawn Redwoods, planted as street trees, a total of 400 km.

The creation of the longest tree avenue in the world

See Figure 2.

The most important tree discovery of the twentieth century

Less than 100 years ago, no one had seen or heard of Dawn Redwood (*M. glyptostroboides*). It was first noted in 1941, as a Coal Measures fossil record, when a Japanese paleobotanist named Shigeru Miki noticed a plant fossil similar to Sequoia, but not quite the same. The fossil record at the time indicated that this plant was

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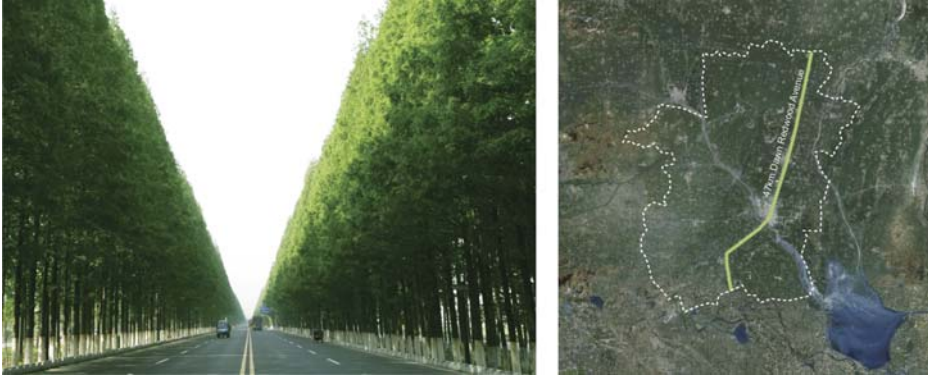


Figure 1. Dawn Redwood Avenue, Pizhou, Jiangsu Province, China.

growing 90 million years ago at the time of the dinosaurs, but died out 1.5 million years ago. When publishing his discovery, he named the new genus *Metasequoia*, which means “like Sequoia”. His paper was read by Professor Hu Hsen Hsu, Director of the Fan Memorial Institute of Biology in Beijing. Five years later, when seeds and samples of a mysterious tree were delivered to him from a seed collecting expedition in 1946, he remembered it. Professor Hu is one of those credited with the discovery of *M. glyptostroboides* as a living tree.

Until 1948, *M. glyptostroboides* was thought to be long extinct. However, it became heralded as the most important plant discovery of the last century when it was finally announced that a previously unrecorded living species had been discovered in 1943 as a small group of unidentified trees growing in Moudao, in Lichuan County, Hubei Province, China.

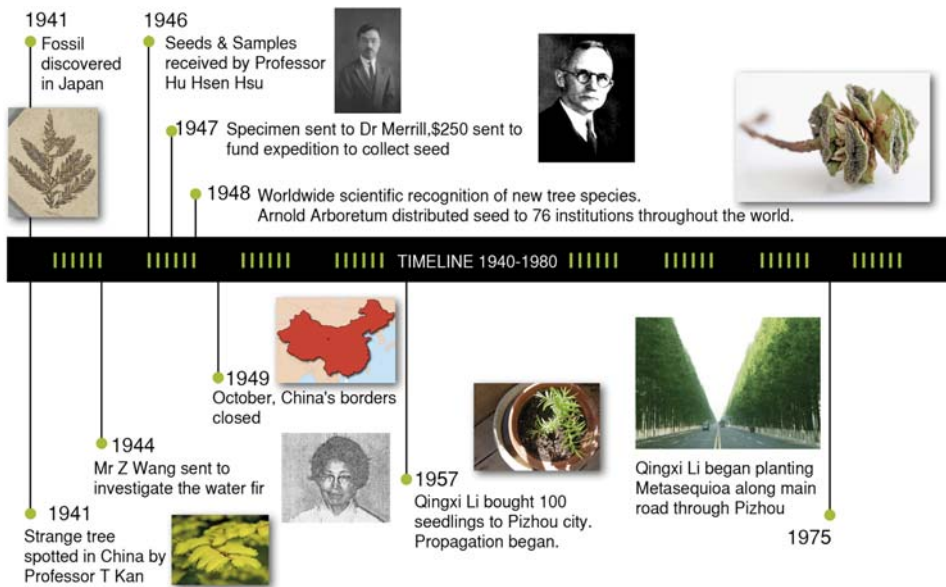


Figure 2. *Metasequoia* Avenue timeline.

According to Hu (1948), ironically the living tree had been first seen in 1941 by Professor T. Kan of the Department of Forestry of the National Central University in Nanjing. At Moudao (also known as Mou-tao-chi, Modaoqi, Modaoxi), Hubei Province, Professor Kan noticed a large deciduous tree by the roadside adjacent to a small temple. The locals referred to the tree as shui-sa (water fir), and revered it as housing a god. Being winter, there were no seeds or foliage to collect, so he asked an academic colleague to collect some the following year. These were either lost or never collected, but the mystery of shui-sa remained. Finally, in 1944, Mr T. Wang from the National Bureau of Forest Research was going to visit forests in a nearby area, and he was asked to investigate the water fir. He returned with samples of seeds, leaves, branches and cones of the water fir, some of which he gave to Mr Wu and Professor W.C. Cheng, both of the Forestry Department of the National Central University in Nanjing. Professor Cheng sent his assistant Mr C.H. Hsieh twice to Moudao in February and May 1946, and it was some of the samples collected on these occasions that were given to Professor of Hu who was familiar with Shigeru Miki's paper describing the *Metasequoia* fossil. Professor Hu had already recognised similarities between the fossil *Metasequoia* and another fossil erroneously identified as a Sequoia, so when presented with the herbarium samples from the water fir, he immediately recognised the characteristics identifying the source tree as a living specimen of that which had previously only been known as a *Metasequoia* fossil. Professor Hu named the living species *M. glyptostrobooides* after *Glyptostrobus* the Chinese swamp cypress. It had taken five years between finding this rare tree, and identifying it against a backdrop of World War II, and Chinese post-revolution physical and political upheaval.

Professor Hu shared his findings with Professor Ralph Chaney of the Department of Palaeontology at the University of California, and Dr Elmer Merrill, Director of the Harvard University Arnold Arboretum in Boston. In 1947, Professor Cheng sent a specimen to Dr Merrill who agreed to send \$250 to fund an expedition by Mr C.T. Hwa to collect more seed from the water fir. Large quantities of the collected seed were sent to interested groups and persons around the world in 1948 in an effort to preserve the species and research its tolerance for various growing conditions, Dr Merrill alone distributed it to 76 institutions. Subsequent expeditions to nearby forests found that there are only approximately 1000 *M. glyptostrobooides* trees in the area, and today they have protected status.

China's bamboo curtain

In October 1949, Chairman Mao Zedong launched the new People's Republic of China and closed the borders, cutting off all trade and sharing of information with the outside world. After worldwide scientific recognition of the new tree species in 1948, obtaining seeds from the originals in China became impossible.

Under the Cultural Revolution, the rural landscape of China changed dramatically. Between 1949 and 1960, the "Great Leap Forward" saw a countrywide programme of land reform, where land owned by private landlords was confiscated by the state, and country people were relocated into collective farms. The pattern of farmland changed from fragmented smallholdings into large geometric fields without boundaries. The speed of landscape change was astonishingly rapid. Although the eighteenth century UK Agricultural Revolution, led by Enclosure Acts, changes took over 100 years to complete, China recreated a new agricultural landscape in 10 years.

Trees and forests disappeared from the landscape. Major infrastructure projects were part of the reform, including the construction of more roads. Where a new road was

required, it was simply a matter of drawing a straight line on the map, because all land now belonged to the state. New roads did not have new trees.

Interestingly, the Department of Forestry of the National Central University in Nanjing successfully propagated seedling Dawn Redwood trees, and planted them along new roads within the Nanjing campus in the 1950s, making these the oldest Dawn Redwood avenues in the world.

Planting the Pizhou Avenue

In 1957, a far-sighted Pizhou Parks Manager, Qingxi Li, brought 100 of these Dawn Redwood seedlings from Nanjing Forestry College. He had a vision for transforming Pizhou's landscape and he began to propagate many more seedlings. The trees and successive generations of seedlings grew well over the following 18 years, but very few trees were planted in China during the Cultural Revolution, a period when many cities cut down their street trees.

Towards the end of Chairman Mao's period the anti-tree policy was relaxed and in 1975 Qingxi Li began planting the World's Longest Dawn Redwood Avenue along the main road through Pizhou County, 60-km long. There were no restrictions to tree planting, no objections from landowners and no restrictions of underground services. Qingxi Li had a clear run. A million trees later, his task was complete.

Dawn Redwood will eventually reach 40-m height, so this colossal landmark will continue to astonish visitors for hundreds of years to come (Figure 3).



Figure 3. Dawn Redwood Avenue in autumn and winter.

International significance of the Pizhou Avenue

Until the discovery of the Pizhou Dawn Redwood Avenue, the world's longest avenue as recognised by the *Guinness Book of Records* was thought to be a 35-km Japanese Cedar (*Cryptomeria japonica*) avenue in Nikko Japan. This avenue is in three parts, and was planted in 1625.

The Pizhou Dawn Redwood Avenue was planted in 1975, and was originally 60-km long. It is now 47-km long, in two parts, split by the removal of a 13-km length.

Pizhou's avenue exists because of a unique opportunity, which could only have arisen in post-Mao China. Fortuitously, a knowledgeable Parks Manager from Nanjing Forestry College seized the chance to create an international landmark using the rarest known tree

in the world. Only the Department of Forestry of the National Central University in Nanjing knew about the Dawn Redwood's suitability as a street tree. Only in Nanjing were they propagating the rarest tree in the world in vast quantities. Only in China, after half a century of war, political upheaval and land ownership reform, did the opportunity exist to plant an avenue of this scale.

Management intentions

Weddle Landscape Design is preparing recommendations for long-term protection and conservation of the Dawn Redwood Avenue. The original planting is at close spacing and has been unmanaged for 30 years. A thinning programme will aim to remove weak trees and select better specimens to grow on, initially at 5-m spacing and later at 10-m spacing.

The original 60-km avenue has been interrupted by the removal of a 13-km length caused by the expansion of a new town. It is hoped that this will be replanted.

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Notes on contributor

Mike Browell graduated from Liverpool University and received a Masters from Sheffield University. He is a Fellow of the Landscape Institute, Member of the Institute of Horticulture and Associate of the Arboricultural Association. Mike has over 35 years experience in practice and specialises in ecological design and interior horticulture. He is the Principal of Weddle Landscape Design (www.weddles.co.uk) a landscape architecture and environmental planning consultancy practice based in Sheffield. For the past 4 years, he has been carrying out landscape planning and design projects in China. Among his projects in China, a Temperate Glasshouse for the 2014 International Horticultural Expo and a Biofarm and Ecotown are also included. He is a Visiting Professor at the China Institute of Mining and Technology at Xuzhou.

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