
WORLD HERITAGE NOMINATION - IUCN TECHNICAL EVALUATION

MOUNT WUYI (CHINA)

1. DOCUMENTATION

- i) **IUCN/WCMC Data Sheet** (4 References).
- ii) **Additional Literature Consulted:** State Environmental Protection Administration. 1998. **China's Biodiversity: a country study**. Beijing; Hideo Tagawa and Mitsuru Hotta. ed. 1997. **Co-existence of the World Humid Evergreen Forest Ecosystems and People**. in *Tropics* 6(4); Chen Changdu. 1999. **On the position of Wuyishan Mountain in the biodiversity conservation of China**. Peking University, 3/1999.
- iii) **Consultations:** 4 external reviewers, Peking University, Beijing, local scientific and cultural experts of Fujian Province.
- iv) **Field visit:** March-April, 1999. Les F. Molloy.

2. SUMMARY OF NATURAL VALUES

Mount Wuyi lies along the north-western boundary of Fujian Province (with Jiangxi Province) in south-eastern China. They form the watershed between tributaries of the lower Yangtze Kiang to the north, and the Min River system of Fujian to the south. Mount Wuyi is heavily forested, with steep slopes and deep gorges. The range is the highest in south-east China and is sometimes referred to as "The Roof of Eastern China". The highest peak, Mt. Huanggang, is 2,158m and there are more than 110 other peaks higher than 1,000m.

Mount Wuyi lies along latitudes 27-28° N and, because they are only 250km from the East China Sea, they have a warm, wet and foggy climate subject to the monsoonal influence. The annual precipitation varies little throughout the site, ranging from 2,200mm in the SW to 3,200mm in the NE around Mt. Huanggang. Although Mount Wuyi lies within the subtropical climatic zone, snow can lie for up to one month in winter in the mountain meadowlands above 1,800m.

The site nominated covers an area of just under 100,000ha, consisting of four sectors (the first three being contiguous, see Map):

- ◆ A western Biodiversity Protection Area (63,575ha);
- ◆ A central Ecological Protection Area around the middle gorges of the Nine-Bend Stream;
- ◆ An eastern Scenic Protection Area (both natural and cultural) around the spectacular lower gorge of Nine-Bend Stream. (Zones 2 & 3 together total 36,400ha); and
- ◆ A separate area of 48ha, about 15km to the south-east, protecting the remains of the ancient city of the MinYue people who were assimilated into the Han empire.

In addition, there is a buffer zone of 27,888ha around the entire site.

The spectacular landforms in the eastern scenic area around the Nine-Bend stream gorge are isolated, sheer-sided monoliths of the local red sandstone. They dominate the skyline for a tortuous 10km section of the river (which has high water quality), standing 200-400m above the riverbed. The landscape has been formed by water cutting down through rectangular jointing in the sandstone, and periodic gravity collapse of huge blocks. It is a geomorphology which contains a lot of overhangs and caves, hence their use by the ancient Min and Yue people for burials in suspended 'boat coffins'.

The rocks of the western peaks are more volcanic or plutonic, with peaks above 1,500m consisting of hard tuffaceous lavas, rhyolite and granite. This area is bisected by a pronounced north-east/south-west fault, which is followed by the headwaters of Nine-Bend Stream. Access to this virtually uninhabited core biodiversity zone is difficult and is strictly controlled. A former military road gives four wheel drive access to Mt Huanggang and there are a small number of walking tracks. Otherwise the core area of nearly 60,000ha of the biodiversity protection zone is unmodified – probably the largest intact wilderness in southeast China.

Mount Wuyi has long been recognised as a centre of biodiversity in China. Since the famous English botanist R. Fortune visited Mount Wuyi to collect specimens in 1845, the mountains have attracted dozens of scientists from within China, Europe and the USA. Type specimens number close to 1,000 and most were collected from the Guadun and Dazhulan localities within the heart of the core area; most of these are now held in international museums, in London, Berlin, New York and Honolulu. The original Nature Reserve was designated in April 1979, then recognised as a key national Nature Reserve by the Chinese State Council in July 1979, and accepted as a MAB Biosphere Reserve by UNESCO in 1987. According to the recently-published, national strategic document, "*China's Biodiversity: a country study*", it is considered to be one of the 11 critical regions for biodiversity conservation in China – and the only one in south-eastern China. Its importance stems from its geographic location and climate, making it a mid-subtropical mixing zone between the temperate biotas to the north and the tropical to the south. Mount Wuyi is characterised by high species richness and many endemic species.

Within the western core lies the largest (30,000ha), intact mid-subtropical pristine forest in China. Five broad altitudinal vegetation belts are recognised, from evergreen broadleaf forest on red soils at 350m, to mountain meadow grassland (on mountain meadow soils) at 1,700-2,100m. However, these can be further broken down into 53 discrete plant associations. A total of 3,728 different plant species have been found, of which 2,888 are higher plants – including 282 fern species (85 genera), 25 gymnosperm species (18 genera) and 2,222 angiosperms (812 genera). The richest plant biodiversity is in the evergreen broadleaf forest type. The diversity of bamboo forest associations (14) and the number of orchids (78 species in 32 genera) are also noteworthy features. Within this flora there are 48 recognised plants endemic to Mount Wuyi, most of them ferns and bamboo.

Because of the wide variety of geological and geomorphological niches, microclimates, and the lack of any significant impact of the Pleistocene glaciations, Mount Wuyi has become a refuge for ancient and relic plants which are very rare elsewhere in China. The foremost is the endemic maidenhair tree, (the only member of its family), as well as many other rare gymnosperms and notable angiosperms. In addition, the importance of Mount Wuyi as a plant refuge is indicated by the large number of families present which contain only one (or very few) members, and the presence of a number of ancient families such as the Magnoliaceae, Illiciaceae, Lardizabalaceae, and Schisandraceae.

Mount Wuyi is even more famous for its fauna. To date 475 vertebrate animal species have been identified, including 71 mammals, 256 birds, 73 reptiles, 40 fishes, and 35 amphibians. Of these vertebrates, 49 are endemic to China, including the near-extinct Chinese tiger. Other rare animals are the clouded leopard, and three vertebrates endemic to Mount Wuyi – the 'horned toad' and another amphibian, and the bird David's Parrotbill. Mount Wuyi is also an important site for migratory birds and over 100 are protected under the Sino-Japanese and Sino-Australian agreements. A total of 143

species are under some form of State protection order (with 11 under 1st class protection) and 46 are listed under CITES.

The region is also renowned for its insect fauna, with 4,560 species identified to date. Estimates of the total number of insect species range from 10,000 to 20,000. In particular, Mount Wuyi is acknowledged as having an internationally outstanding amphibian, reptile and insect fauna.

3. COMPARISON WITH OTHER NATURAL AREAS

The nomination considers Mount Wuyi to be the best example of a tract of humid subtropical forest in China. Arguably, the most extensive remaining humid subtropical forests in the world are in southern China, between latitude 30° N and the Tropic of Cancer. Comparisons are difficult with other parts of the world because of climatic and floristic differences. At these latitudes (24-30° N) throughout most of the Northern Hemisphere, the prevailing biomes are deserts and high mountains. Comparable humid subtropical climatic environments (and the potential for subtropical evergreen broadleaf forests) can only be found in Florida, the foothills of the Himalaya and northern Myanmar, and the islands of Taiwan and southern Japan. Generally, these forests, on the mid-altitude slopes, are all dominated by trees from the Fagaceae, Lauraceae, Theaceae, Magnoliaceae, Elaeocarpaceae, and Hamamelidaceae, etc, while at higher altitudes this merges into a distinctive ‘cloud forest’ of Ericaceae and conifers of the Pinaceae, Taxodiaceae, Taxaceae and Cupressaceae families.

Within China, there are three other forested natural sites on the World Heritage list – Huangshan, Wulingyuan (now locally referred to as ‘Zhangjiajie’ after the name change of the locality) and Mt Emei – all lying within this broad subtropical climatic zone of the Palaearctic Realm. Wulingyuan site was only listed on scenic grounds but both Huangshan and Mt Emei qualified because of their biodiversity values [criterion (iv)]. Like Mount Wuyi, Huangshan and Mt Emei sites have a wide altitudinal range of vegetation; Huangshan is lower, while Mt Emei is nearly 1,000m higher than Mt Huanggang in Mount Wuyi. In terms of Udvardy Biogeographical Provinces, both Wulingyuan and Huangshan lie within the Oriental Deciduous Forest and Mt Emei spans both the Oriental Deciduous Forest and Chinese Subtropical Forest. Mount Wuyi, however, is on the border between both the Chinese Subtropical Forest and the South Chinese Rainforest. Mount Wuyi, therefore, has many of the biogeographic features of the Indomalayan Realm – it is warmer, wetter and has more tropical elements in its biota.

A comparison of the biodiversity of the three sites – Mount Wuyi, Huangshan and Mt Emei – indicates the pre-eminence of Mount Wuyi. Both Mount Wuyi and Mt Emei have an outstanding number of different plant species (3,600-3,700), each about 250% more than Huangshan. But it is in the number and variety of animals that Mount Wuyi stands out above the other two sites. The table in Figure 1 below shows that Mount Wuyi and Mt Emei have similar numbers of species of birds and amphibians, but Mount Wuyi has less fish, more mammals and more than twice the number of reptile species. The insect fauna of Mount Wuyi far surpasses that of Mt Emei in number (and variety) of species.

The WCMC protected area data base lists nearly 200 other protected areas within the South Chinese Rainforest and Chinese Subtropical Forest biogeographic provinces. Eight of them (in addition to Mount Wuyi) are larger than 55,000ha. but none of these are considered to have the biodiversity values of Mount Wuyi.

World Heritage (natural) site	Area (ha)	Total vertebrates	Mammals	Birds	Reptiles	Amphibians	Fish	Insects
Mount Wuyi	99,975	475	71	256	73	35	40	4,560
Mount Emei and Leshan	15,400	434	51	256	34	33	60	c.1,000
Mount Huangshan	15,400	300	48	170	38	20	24	n.r.
Yakushima (Japan)	10,747	n.r.	16	150	15	8	n.r.	1,900

n.r. = not reported

Figure 1. Numbers of animal species, comparing Mount Wuyi with other East Asian World Heritage sites

The only other comparable East Asian site on the World Heritage list is the island of Yakushima at 30° N in southern Japan, within the Japanese Evergreen Forest biogeographic province. Yakushima has just as wide an altitudinal range of forest (sea level to almost 2,000m) but the site is much smaller and does not have the robust shape of Mount Wuyi. However, Yakushima is a much wetter site (up to 10,000mm around the summits) and it has more of a warm temperate character (as opposed to subtropical). Yakushima is listed under criteria (ii) and (iii), but not criterion (iv); reference to Fig.1 illustrates that Yakushima has much lower total biodiversity (as befits a small island) although there are many other outstanding features to its flora.

4. INTEGRITY

One of the strengths of the nomination is its high level of ecological and landscape integrity (and on-going scientific research), and its long history of management as a protected area.

The positive integrity features are as follows:

- ◆ large size (c.100,000ha) with a diverse range of peak and valley landforms. [Fig. 1 shows the large size of Mount Wuyi relative to the limited size of the comparable existing World Heritage sites];
- ◆ the protected area lies within one provincial administration (Fujian);
- ◆ the site has an effective buffer zone;
- ◆ there are few inhabitants in the core zone (60,000ha); the 22,700 inhabitants in Mount Wuyi are scattered through 14 villages primarily in the ‘ecological protection’ and ‘scenic & cultural protection’ planning zones;
- ◆ the site has had a strict protective status since 1979, but prior to that provincial and central governments had issued protective edicts over the area for more than 1,000 years. The first edict banning forest-felling and fishing was made in the year 748 AD of the Tang Dynasty. In addition, 13 of the 450 historic rock inscriptions along the lower gorge of the Nine-Bend River exhort visitors and occupants to protect Nature; and

- ◆ a history of comprehensive management planning, beginning with the 1986 master plan for the scenic and historic areas, followed by the 1995 protection plan for the Chengcun Han Dynasty city, and in February 1998 the management plan for the nature reserve (biodiversity protection zone), produced with the support of the Global Environment Facility (GEF).

5. ADDITIONAL COMMENTS

5.1. Biosphere Reserve

The Biosphere Reserve status of the ‘biodiversity protection’ sector of the site for the past 12 years has meant that a great deal of scientific information has been able to be assembled for the nomination. On-going research is being assisted with finance from the GEF. There is a scientific museum at Sangang village in the heart of the protection zone, where the MAB research work is outlined and a comprehensive range of specimens are displayed to illustrate Mount Wuyi’s biodiversity.

5.2. Visitor issues

Mount Wuyi is very fortunate in that it does not yet (and may not) suffer the acute pressures of visitors now afflicting many natural sites in China, such as Taishan, Wulingyuan and Jiuzhaigou. Nevertheless, visitor numbers have increased to around 700,000 per annum. Of these, 300,000 annually raft down the Nine-Bend River gorge and another 120,000 visit the ‘Thread of Sky’ caves close by in the scenic zone. Visitor access to the biodiversity protection core (beyond Sangang village) is strictly controlled.

The rafting operation is very professionally controlled through a booking system and strict environmental codes. Up to 1,000 visitors daily are carried through the 10km stretch of the river, in raft relays, without congestion, noise, or water/air pollution.

There is no hotel accommodation within the site and it is the intention of site management to keep all such infrastructure in the ‘tourist service area’ outside.

5.3. Cultural landscape

IUCN’s comments on the site as a potential cultural landscape have been submitted to ICOMOS.

6. APPLICATION OF WORLD HERITAGE CRITERIA

Mount Wuyi site is nominated under criteria (ii), (iii) and (iv). Most of the documentation in the nomination document relates to the latter two criteria.

Criterion (ii): Ecological processes

There is evidence of species differentiation but, considering the fact that Mount Wuyi escaped the rejuvenating effects of the last glaciation, it is surprising that there is not more evidence presented of on-going biological evolution. IUCN considers that the site does not meet criterion (ii).

Criterion (iii): Superlative natural phenomena, scenic beauty

The case for criterion (iii) is also strong with respect to the features in the eastern scenic zone, especially the riverine landscape of Nine-Bend Stream (lower gorge). Rugged rock monoliths are a feature of other natural sites, such as Wulingyuan and Huangshan, but Mount Wuyi is exceptional in its juxtaposition of smooth rock cliffs with clear, deep water. The ancient cliff tracks are an important

dimension of the site, allowing the visitor to get a ‘birds-eye-view’ of the river that they are travelling down. IUCN considers that the site meets criterion (iii).

Criterion (iv): Biodiversity and threatened species

The biodiversity case made out for listing under criterion (iv) is the strongest. In essence (not withstanding Mt Emei), Mount Wuyi is the first natural Chinese site to be nominated on its biodiversity values, as much as its scenic values. The evidence points to Mount Wuyi being the outstanding biodiversity conservation site in south-east China and one of the outstanding subtropical forests in the world. Its floral importance is twofold:

- ◆ it is the largest, most representative example of a largely-intact forest encompassing the diversity of the Chinese Subtropical Forest and the South Chinese Rainforest; and
- ◆ it is a refuge for a large number of ancient, relict species, many of them endemic to China. Many of these plants are now very rare elsewhere in China.

Furthermore, in comparison with other Chinese (and East Asian) sites, its fauna show greater diversity in numbers of species and especially in the number and nature of its reptiles, amphibians and insects. IUCN considers that the site meets criterion (iv).

7. RECOMMENDATION

At its twenty-third ordinary session, the Bureau recommended that the World Heritage Committee **inscribe** Mount Wuyi under natural criteria (iii) and (iv).