

ASIA / PACIFIC

SOUTH CHINA KARST

CHINA



WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

SOUTH CHINA KARST (CHINA) – ID No. 1248

Background note: The IUCN Technical Evaluation of the Lunan Scenic Area of the Stone Forest, nominated by China as a natural property in 1991, and now part of one of the three components of the current serial nomination (Shilin Karst), was not discussed at the 16th session of the World Heritage Committee (Santa Fe, 1992) because the State Party had requested that this nomination not be examined. IUCN's evaluation noted a number of deficiencies in the nomination including the lack of comparative analysis and demonstration of the outstanding universal value of the site. The State Party submitted on 16 January 2006 the current serial nomination of three clusters as Phase 1 (with two more to come) which is the subject of this evaluation.

1. DOCUMENTATION

- i) **Date nomination received by IUCN:** April 2006
- ii) **Dates on which any additional information was officially requested from and provided by the State Party:** IUCN requested supplementary information on 18 August 2006 before the IUCN Evaluation Mission. The State Party responses were received in October and December 2006, including responses to all the issues raised by IUCN.
- iii) **UNEP-WCMC Data Sheet:** 3 references (including nomination)
- iv) **Additional literature consulted:** IUCN (1997). **Guidelines for Cave and Karst Protection.** IUCN WCPA Working Group on Cave and Karst Protection. IUCN (2005). **Geological World Heritage: A Global Framework.** IUCN.
- v) **Consultations:** 19 external reviewers. Extensive consultations were undertaken during the field visit with: representatives of the State Ministry of Construction and Ministry of Foreign Affairs in Beijing; Yunnan and Guizhou Provinces; Chongqing City; local government including local mayors; Chinese National Commission for UNESCO; Chinese Academy of Sciences and Kunming Technical University; and Communist Party of China.
- vi) **Field visit:** Jim Thorsell, September 2006
- vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The South China Karst region extends over 500,000 km² – an area approximately 1,380 km from west to east, and 1,010 km from north to south, lying mainly in Yunnan, Guizhou and Guangxi Provinces, but also extending into parts of Chongqing, Sichuan, Hunan, Hubei and Guangdong. The South China Karst displays a series of karst landforms in a variety of humid, sub-humid, tropical and sub-tropical climate conditions, and geographical settings.

The nominated property contains a cross-section of key features of the regional geology of the area including the deposition of carbonates up to the Triassic period (250 million years ago) and the subsequent tectonic evolution of the area including three phases of evolution during the Quaternary period (about 2 million years). The geological histories of the mature karst landscapes of the present and the palaeokarst landscapes of the past are “intact” as

they were little affected by glaciation. The great variety of karst landscapes in the South China Karst is attributed to 1) the age of the thick accumulations of limestone which has resulted in relatively hard limestone and, in turn, in more stable and massive landforms, and 2) the influence of several phases of tectonic uplift (including a major recent phase associated with the Himalayan orogeny, or mountain building, and associated with the uplift of the Tibetan plateau) causing folding and faulting of the rocks and, in turn, promoting the access of water to corrode and erode the limestone to the current karst forms.

The nominated property of the South China Karst comprises seven protected areas in three separate clusters: the Shilin Karst (2 sites), Libo Karst (2 sites) and Wulong Karst (3 sites) as shown in Table 1. The current serial nomination is intended to be the first phase of a comprehensive series comprising the most outstanding of the sites within the South China Karst (see section 5.2 below). Although the State Party considers

Table 1: Name and size of the nominated core zones and their surrounding buffer zones

Name of the site, county and province	Core zone (ha)	Buffer zone (ha)
Shilin Karst 1 (Naigu Stone Forest), Shilin Yi, Yunnan	1,746	4,586
Shilin Karst 2 (Central Stone Forest), Shilin Yi, Yunnan	10,324	18,344
Libo Karst 1 (Da-Xiao Qikong Cone Karst), Libo, Guizhou	7,834	8,479
Libo Karst 2 (Maolan Cone Karst), Libo, Guizhou	21,684	35,019
Wulong Karst 1 (Qingkou Giant Doline), Wulong, Chongqing City	1,246	3,000
Wulong Karst 2 (Three Natural Bridges), Wulong, Chongqing City	2,202	4,000
Wulong Karst 3 (Furong Cave System), Wulong, Chongqing City	2,552	25,000
Total area (ha)	47,588	98,428

each site of the series as worthy of World Heritage listing in its own right, the rationale for the series is that a serial approach appears to ensure that site selection is carried out within a coherent framework and that the landscape diversity across the South China Karst region as a whole is reflected in the nomination.

The nomination notes four landscape types as outstanding. These have considerable internal landscape diversity, but can be summarised as:

- ◆ Fengcong karst (cone karst) – characterised by linked conical hills and depressions, valleys and gorges;
- ◆ Fenglin karst (tower karst) – comprising isolated cones or towers on broad plains;
- ◆ Stone forests – with a wide diversity of closely spaced pinnacles and towers; and
- ◆ Tiankeng karst (giant dolines) – massive circular collapse structures often in close proximity to spectacular gorges, decorated caves and where cave/doline collapse can create natural rock bridges.

Each of the three clusters nominated in this first phase of the nomination has a different set of natural features, as follows:

Shilin Karst (Yunnan): The two core zones of this cluster, which share a single buffer zone, contain examples of “stone forest” karst landscapes noted for high limestone pinnacles and towers decorated with deep, sharp karren. They have been selected as classic examples of the variety of stone forests that are found within the South China Karst. The Shilin stone forests illustrate the episodic nature of the evolution of these karst features, which span 270 million years.

Libo Karst (Guizhou): The two core zones of this cluster, which share a single buffer zone, illustrate the geomorphological exchange and evolution between fengcong landscapes and fenglin landscapes. They provide classic examples of a diverse variety of cone and tower karst landscapes and contain a combination of numerous tall karst peaks, deep dolines, sinking streams, and long and large river caves. This cluster is also noted for its biodiversity values, which include the presence of over 314 vertebrate species, 1,532 plant species, including several endemic species and a number of plants and animals that are globally or nationally endangered.

Wulong Karst (Chongqing): The three core zones of this cluster, each with its own buffer zone, provide an example of a karst landscape that has evolved in areas where thick sequences of pure carbonate rocks have been subjected to tectonic uplift. The Qingkou Giant Doline, some 200-250 m in diameter, represents tiankeng karst. The Three Natural Bridges, which are 223, 235 and 281 m in height, illustrate the development of karst gorges and valleys. This area also includes further giant dolines. The Furong Cave System illustrates how tectonic processes lead to the formation of large caverns and chambers that subsequently become decorated by speleothems.

Minority peoples, including the Yi (Shilin) and the Shui, Yao and Buyi (Libo), comprise the majority of residents in two of the nominated areas and in others that are being considered for future nomination within the series. There is a strong relationship between karst and the cultural identity and traditions of these minority groups. In Shilin, the Yi people have developed a lifestyle adapted to the karst environment, and the stone forests are reflected in every aspect of their culture. In Libo, the Shui people have been given special recognition in the creation of the Maolan Biosphere Reserve. They have managed their lands for at least a thousand years and provide an exemplary example of sustainable forest management. It has been suggested

that they may be authors of a manuscript that may be the earliest written manual on sustainable forest management.

3. COMPARISONS WITH OTHER AREAS

The nomination is accompanied by a comprehensive global comparative analysis that has been developed with an extensive dialogue within the international karst community, and provides an exemplary standard for other nominations. It also includes a volume that can be regarded as a reference statement for karst areas in relation to the World Heritage List.

Karst areas cover an estimated 12% of global continental areas, mainly in the Mediterranean, Eastern Europe, Middle East, Southeast Asia, Southeast America, and Caribbean. With an area of about 500,000 km² the South China Karst is unrivalled in its area, depth, and diversity of karst forms. It can be considered as one of the two great karst regions of the world: the other is the 'classical karst' of the eastern Adriatic region of Europe, extending through Slovenia, Croatia, Bosnia-Herzegovina and Montenegro. This is the type site for temperate karst and its values are reflected on the World Heritage List by the Škocjan Caves, Slovenia and Plitvice Lakes, Croatia. It is therefore clear that the phenomenon of the South China Karst as a whole can be accepted, in principle, as providing a strong basis for identifying outstanding universal value. One area of reservation in relation to the current selection of properties across the three anticipated phases of the nomination is that the South China Karst region extends into Viet Nam, and that the significant karst landscape in North Viet Nam is coterminous with the Guangxi Karst. The State Party of China has confirmed its willingness to work with Viet Nam to examine possible transnational cooperation.

Comparisons are considered for each of the three clusters within this phase of the nomination. This is an appropriate approach as the stated intention is that each of the nominated clusters should be of sufficient significance to stand alone as a World Heritage property. It is also important as the series is proposed in a number of phases, and the relative merits of sites in Phase 1 need to be considered in the context of other sites that may be put forward in the future.

The Shilin Karst can be compared with stone forests already on the World Heritage List such as in Gunung Mulu National Park, Malaysia and Tsingy de Bemahara Strict Nature Reserve, Madagascar. Based on the evidence provided by the nomination and a number of experts, it can be concluded that the Shilin cluster is regarded as the world's best example of stone forests – it is considered the type site for this feature and is distinguished by having the longest geomorphological history, spanning 270 million years. It is the best example of this landform within South China. Reviewers have however noted that there is significantly greater human impact on this area than on either Gunung Mulu or Tsingy de Bemahara, and in particular that disturbance has resulted in a significant loss of biological values.

The Libo Karst is nominated because of its cone karst, and is also considered by reviewers to display unrivalled features, although exceptional karst cones are found in other humid tropical landscapes, the most famous ones

being those of Gunung Sewu on Java. Cone karst is also a prominent feature in three existing World Heritage properties: Gunung Mulu National Park, Phong Nha-Ke Bang National Park, Viet Nam and Puerto-Princesa Subterranean River National Park, Philippines. On the other hand, Purnululu National Park, Australia is an outstanding example of cone karst formed in sandstone. Mulun Nature Reserve in Guangxi, which is adjacent to the Libo cluster and considered to be less disturbed and of complementary value to this cluster, is proposed for inclusion within the next phase of the nomination. Both the Libo Karst on its own, and in combination with the proposed future extension into Mulun, can be regarded as the world type site for cone karst. The Libo cluster is also nominated for its biodiversity values, although a number of large and rare mammals are either absent or very limited in their abundance. While the overall biodiversity of the Libo cluster is comparable with the forested karst regions of Southeast Asia, other World Heritage properties in Southeast Asia, being more tropical, generally contain a larger number of species (see Table 2).

The Wulong Karst is nominated because of its giant dolines, natural bridges and caves. However, the case for the outstanding universal value of the Wulong cluster is less convincing than for the other two nominated clusters, and there is no consensus amongst reviewers on the values put forward. It appears that all the features in this cluster are also found in other areas in China and/or in other World Heritage properties. The nomination claims that the giant collapsed dolines in Wulong are features generally not found in other World Heritage properties in Asia, but they are part of the values of Gunung Mulu, and extensive dolines can also be found at the Škocjan Caves as well as in other areas in China. Approximately 50 giant tiankeng dolines are known within China, many of which have greater dimensions than those found in Wulong. A number of reviewers have therefore questioned the selection of these dolines, as opposed to others such as the dolines in Leye (Guangxi). Giant natural bridges can also be found in the Chinese Wulingyuan World Heritage property – the height of the highest natural bridge in Wulingyuan (357 m) even exceeds that of Wulong (281 m). Wulingyuan's natural bridges, however, are considered pseudo-karst, are not composed of limestone, and are the result of a different geological process. Wulong's bridges thus appear to be the largest such bridges in a limestone karst. China has also a number of larger and scientifically more important caves than Furong cave. Although valuable in the study of the evolution of karst in the Yangtze basin, the Furong cave does not have the extensive dimensions or decorations found in the caves of other World Heritage properties (Gunung Mulu, Škocjan Caves, Caves of Aggtelek Karst and Slovak Karst in Hungary and Slovakia, and Carlsbad Caverns and Mammoth Caves in the USA).

In summary, comparative analysis provides clear support for the outstanding universal value of the Shilin and Libo clusters, however the case for the Wulong cluster is not convincing at this time, and it is noted in particular that many reviewers have suggested that other Chinese sites exceed it in value.

Table 2: Comparison of biodiversity (species numbers) between the nominated property and some comparable existing World Heritage properties

Name and size of World Heritage property	Criteria	Plants	Mammals	Birds	Reptiles and Amphibians	Fish
<i>Shilin Karst (China)</i> 12,070 ha	<i>vii, viii</i>	889	42	87	44	12
<i>Libo Karst (China)</i> 29,518 ha	<i>viii, ix, x</i>	1,532	59	137	75	43
<i>Wulong Karst (China)</i> 6,000 ha	<i>viii</i>	558	46	174	48	64
Huanglong (China) 70,000 ha	vii	1,500	59	155	10	2
Wulingyuan (China) 26,400 ha	vii	3,000	34	53	29	?
Gunung Mulu (Malaysia) 52,864 ha	vii, viii, ix, x	3,500	81	270	131	48
Dong Phrayayen-Khao Yai (Thailand) 615,500 ha	x	2,500	112	392	200	?
Thungyai-Huai Kha Khaeng (Thailand) 622,200 ha	vii, ix, x	?	120	400	139	113
Phong Nha-Ke Bang (Viet Nam) 85,754 ha	viii	876	113	302	81	72

4. INTEGRITY

4.1 Legal status

The nomination clearly identifies the provisions and relevant articles that govern the legal status of the nominated property. The laws and regulations of the People's Republic of China provide the legal basis for conservation and management planning of heritage areas. Legal provisions for protection are written into the Constitution of the People's Republic of China, and there are national laws for environmental protection, wildlife protection, forestry and water. There are also provisional regulations concerning management of scenic and historic areas, and regulations on nature reserves. The Shilin, Libo and Wulong karsts have protective designations dating back to 1982, including National Scenic and Historic Areas, National Geological Parks, National Nature Reserve, UNESCO Geopark and UNESCO Biosphere Reserve. Each nominated cluster has formulated relevant regulations and management measures.

Supplementing these national and provincial legal measures, there are basic protective regulations at the village level in Shilin (e.g. the Mizhishan Culture tradition of protecting natural vegetation among the Yi people) and Libo (e.g., rules of the Laqiao Group, Raolan Village, Yongkang Town). In Libo, for example, poaching of protected species is punishable by group leaders or by fines ranging from 10 to 500 Yuan (US\$ 1 to 65). Serious cases are reported to the reserve administration. Such village rules are beneficial because they not only raise local conservation awareness, but also help to inspire a

sense of autonomous stewardship on South China Karst's natural resources.

4.2 Boundaries

The boundaries of the nominated core zones generally follow accepted boundaries of previously established legal entities (although the original Biosphere Reserve boundary in Libo was modified to define a more manageable core zone for World Heritage purposes). Also in Libo, a 20 km stretch of cone karst covered with primary forest extends beyond Guizhou into the Mulun Nature Reserve in Guangxi. The planned inclusion of Mulun in Phase 2 of this nomination as an extension of the Libo cluster will address this issue. In Libo and Shilin, each pair of separate core zones is connected by its surrounding buffer zone, with the buffer zones providing a certain level of catchment protection. In Wulong, each of the three separate core zones is small (although sufficient to encompass the main feature), and the three surrounding buffer zones are not connected. The importance of appropriate buffer zones is further discussed in section 4.4 below.

4.3 Management

The State Ministry of Construction has the overall responsibility for the management of the South China Karst, with assistance from the Ministry of Land Resources and State Forestry Bureau, and the provinces concerned have also set up their own management departments. A total of 20 agencies have management responsibilities in the South China Karst. This is a fairly large group of

stakeholders and during the nomination process regular dialogues were held between them to ensure a coordinated approach.

Protocols for conservation and management planning, site management, monitoring, and preserving local traditions are outlined in the nomination. Management plans are in place for those municipalities, counties and regions in which the South China Karst is located. These include 5-year and longer term Social and Economic Plans, Environmental Protection Plans, Integrated Tourism and Historic Area Plans, Ecological Construction and Demonstration Area Plans. Site management plans have been developed for all nominated clusters, and all clusters appear to have sufficient financial resources to ensure effective implementation of these management plans.

Traditional management by minority peoples is an important feature of the nominated areas. IUCN welcomes the clear recognition of the rights of minority groups to retain control over their traditional lands at the outset of the nomination, and the clear recognition of their contribution to the values of the nominated areas. For management to be effective, minority groups in the South China Karst, including the Yi and Shui people, need to continue to be empowered as stakeholders and involved in site management, especially as they have managed their forests successfully as protected areas for thousands of years. IUCN understands that some villages within the Libo cluster have been relocated recently with compensation provided. IUCN notes the sensitivity of such issues, and in general considers that relocation for conservation should always be carried out with the consent of the population concerned. This is particularly the case where traditional management is an essential part of the maintenance of the forest system, such as at Libo.

4.4 Threats and human and use

Three issues have the potential to affect the long term integrity of the property: downstream effects of upstream runoff, local human impact and tourism growth.

One of the major problems associated with karst regions is the potential downstream effects of runoff from upstream regions, which can transport pollution from those regions into and through the karst. Such problems occur at Libo and to a lesser extent at Wulong and Shilin (as well as in many other karst regions around the world). At Libo, the catchment area is difficult to manage because of the large size of some of the river basins involved, and the Zhangjiang River for example passes through Libo City before entering the buffer zone of the Libo cluster, so management for water quality is crucial. At Shilin, there is a problem of waste water disposal from the tourist township. Waste water from villages and livestock in the buffer zone also requires attention, because it disperses into the groundwater. At Wulong, domestic waste has been observed in an underground stream, emphasizing the need for stricter waste disposal enforcement in the catchment area. Enlargement of buffer zones to include entire small catchments is desirable but may be impracticable in the case of the larger catchments. To reduce the danger that water pollution poses to the nominated property it will be essential to strictly enforce effective water quality management in the catchments of streams and rivers flowing into the protected karst.

Untreated waste water from cities, towns and industries should not be allowed to enter waterways that ultimately drain into the South China Karst, especially their core zones. High water quality standards must be set and regular monitoring (as is underway and explained in the nomination) must be undertaken.

In all of the areas nominated in Phase 1 there are clear signs of local human impact. These are most evident in parts of Shilin, less in Wulong and least in Libo, and are even more evident in the buffer zones. Current population levels in the core zones of the nominated areas are 961 residents in Shilin; 5,751 in Libo, and 3,940 in Wulong. Annual population increases of between 1.8-6.7% have been recorded over the past five years. Management plans for each of the sites note that much agricultural land, especially on steep slopes, is being reverted to natural vegetation. In Wulong, the Environmental Restoration Plan calls for relocation of most residents outside the core zones. Economic activities by residents are mostly traditional agriculture with some cash crops (e.g. tobacco), small-scale food processing, and handicrafts. As part of the policy for promotion of "ecological farming", chemical fertilizer and pesticide use is very limited and discouraged.

This human impact in the South China Karst makes it difficult to find large areas with essentially intact ecosystems both above and below ground. Consequently, the best conservation option is to save the least damaged sites and to actively encourage the existing plans for environmental restoration. This will provide bridges between secondary forest and scattered patches of primary forest, improving wildlife habitat and providing corridors for wildlife movement. In order to promote environmental restoration in nominated areas, special attention is being given by regional authorities to retiring land from agriculture (especially in rocky areas) and to planting shrubs along riparian zones, particularly along river banks. As well as providing habitat, thickly vegetated riparian zones will also be very important for shading streams and treating diffuse runoff from farmed land. The Chinese authorities should be commended on recognizing the impact of water pollution on the property and encouraged in their efforts.

Experience has shown that substantial increases in tourism levels occur at all natural and mixed World Heritage properties in China following their inscription. The large numbers of visitors to Shilin are already a management issue, while in Libo and Wulong tourism numbers are still low. One response to this has been the provision of well-equipped and informative visitor centres in the cluster, and the development of tourism management plans to control the impact of future growth in tourism (e.g. using zoning, monitoring and access control). Measures are also in place to increase indigenous resident and community participation in the tourism sector.

IUCN considers that the nominated property meets the conditions of integrity as required under the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Justification for serial approach

When IUCN evaluates a serial nomination it asks the following questions:

a) What is the justification for the serial approach?

The South China Karst is a coherent region, universally recognized by science as significant, and with a wealth of nationally, regionally and internationally significant karst sites. A serial approach at this stage is justified as the South China Karst is too large (over 500,000 km²) to identify a single site that would be fully representative of the evolution and diverse variety of its karst landforms. Although the State Party considers each site of the series as worthy of World Heritage listing in its own right, the rationale for the series is that a serial approach appears to ensure that site selection is carried out within a coherent framework and that the landscape diversity across the South China Karst region as a whole is reflected in the nomination.

b) Are the separate components of the property functionally linked?

Although the nominated areas provide a range of separate and contrasting landscapes and landforms, they are united in their tectonic and regional geological setting, and, crucially, they all contribute to the representation of a region that is renowned for its distinctive and exceptionally diverse karst features of global importance. The inclusion of a variety of sites within the series is supposed to demonstrate the range of landscapes and landforms of the South China Karst, and although the separate clusters of the nomination are not connected, they can therefore be considered as functionally linked. Moreover, in Libo and Shilin, each pair of separate core zones is connected by its surrounding buffer zone, providing landscape connectivity at the cluster level. In Wulong, however, such landscape connectivity does not exist among the three separate core zones and buffer zones.

c) Is there an overall management framework for all the components?

This is the first trans-provincial serial property that China has proposed, and a major effort in coordinating the preparation of the nomination was required. As noted in section 4.3 above, there are 20 agencies involved in the management of the sites though the umbrella is provided by the State Ministry of Construction (with assistance from the State Forestry Bureau in Libo). There is some variation in regulations between the three nominated clusters in Phase 1 but a general consistency in management plans and activities does exist. There is no overall South China Karst management agency or administrative framework but once the next phase(s) of the nomination are submitted the need for this will be considered. IUCN considers that there is a need to strengthen the overall coordination of management of the South China Karst as part of any further phase(s) of the nomination, but that there are sufficient arrangements to support the serial nomination of three clusters at the present time.

5.2 Next phases of the nomination

The State Party intends to submit two more phases to complete the nomination of the South China Karst:

- ◆ Phase 2 (planned in 2008 or 2009): Yangshuo Karst (Guangxi), Xingyi Karst (Guizhou), Jinfeshan Karst (Chongqing), Mulun Karst (Guangxi); and
- ◆ Phase 3 (planned in 2011 or 2012): Zhijin Cave (Guizhou), Fengjie Karst (Chongqing), Xingwen Karst (Sichuan), Nonggang Karst (Guangxi).

IUCN suggests that sites chosen to complete the serial nomination should between them illustrate 1) the various natural features and landforms (above and below ground) that are integral elements of karst in South China; 2) the history of evolution of karst in southern China; and 3) the ongoing natural processes that have led to the development of the physical and biological attributes of the karst. The ecosystem as a whole should be considered, above and below ground, and not just the physical aspects. Noting the concerns regarding Wulong in the current nomination, IUCN considers that further work is required to confirm whether the scale of the serial nomination currently contemplated by the State Party is justified, as IUCN considers that there may be a case for a reduced scale to the future plans with a total of 4-5 clusters being sufficient to present a 'complete' property. The State Party may therefore wish to consider whether the extent of subsequent phases of the entire series could be rationalized into a smaller number of sites and a single phase of nomination rather than two phases. As the South China Karst region extends across the border into Viet Nam, the Chinese authorities have indicated their intentions to will consider transboundary cooperation in future.

6. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The property has been nominated under all four natural criteria; however each of the three clusters of the serial property has been nominated under different criteria. All have been nominated under criterion (viii), while the Shilin cluster is also nominated under criterion (vii) and the Libo cluster is also nominated under criteria (ix) and (x). However, IUCN considers that the same criteria should be applied across the entire series of sites of serial nominations and has made the following assessment.

IUCN considers that the **Shilin and Libo clusters** of the nominated property meet criteria (vii) and (viii) and proposes the following Statement of Outstanding Universal Value:

South China is unrivalled for the diversity of its karst features and landscapes. The property includes specifically selected areas that are of outstanding universal value to protect and present the best examples of these karst features and landscapes. South China Karst is a coherent serial property comprising two clusters, Libo Karst and Shilin Karst, and each cluster comprises two components.

Criterion (vii): Superlative natural phenomena or natural beauty and aesthetic importance

South China Karst represents one of the world's most spectacular examples of humid tropical to sub-tropical karst landscapes. The stone forests of Shilin are considered superlative natural phenomena and the world reference site for this type of feature. The cluster includes the Naigu stone forest occurring on dolomitic limestone and the Suyishan stone forest arising from a lake. Shilin contains a wider range of pinnacle shapes than other karst landscapes with pinnacles, and a higher diversity of shapes and colours that change with different weather and light conditions. The cone and tower karsts of Libo, also considered the world reference site for these types of karsts, form a distinctive and beautiful landscape.

Criterion (viii): Earth's history, geological and geomorphic features and processes

Both Shilin and Libo are global reference areas for the karst features and landscapes that they exhibit. Major developments in the stone forests of Shilin occurred over some 270 million years during four major geological time periods from the Permian to present, illustrating the episodic nature of the evolution of these karst features. Libo contains carbonate outcrops of different ages that erosive processes shaped over millions of years into impressive fengcong (cone) and fenglin (tower) karsts. It contains a combination of numerous tall karst peaks, deep dolines, sinking streams and long river caves.

Conditions of Integrity, Protection and Management

The property is well managed, with clear management plans in place and the effective involvement of various stakeholders. There are strong international networks in place to support continued research and management. Continued efforts are required to expand and refine buffer zones to protect upstream catchments, and in particular to ensure the necessary long-term protection and management of the catchments. Traditional management by minority peoples is an important feature of both clusters, and the relationship between karst and the cultural identity and traditions of minority groups including the Yi (Shilin) and the Shui, Yao and Buyi (Libo) requires continued recognition and respect in site management. Potential for further extension of the property requires development of a management framework for effective coordination between the different clusters.

IUCN considers, however, that the **Wulong cluster** of the nominated property does not meet criteria (vii) and (viii) at this time, and that none of the clusters of the nominated property meets criteria (ix) and (x) at this time based on the following assessment.

Criterion (vii): Superlative natural phenomena or natural beauty and aesthetic importance

In Wulong, neither Furong cave nor the Tiankeng landscapes appear to meet this criterion, although further consideration of Tiankeng landscapes is anticipated in later stages of the nomination. The three natural rock bridges could be considered as superlative; however in the context of the rather small size of the area, the further consideration needed of Tiankeng landscapes, and the

number of other rock arch sites, IUCN considers it would be premature to inscribe them as part of the series at this stage.

IUCN considers that the **Wulong cluster** of the nominated property does not meet this criterion. IUCN acknowledges, however, that the **Wulong cluster**, or parts thereof, might have the potential to meet this criterion.

Criterion (viii): Earth's history, geological and geomorphic features and processes

The case for this criterion is not as strong for Wulong as for Shilin and Libo, and at present there are significant questions over the inclusion of parts of this cluster, such as Furong cave, and also the relative values compared to other parts of the South China Karst that are considered by many reviewers to be superior. The features in this area are also rather more specialized than in Libo and Shilin, and there are concerns regarding its integrity due to both the small size of the area and the discontinuous nature of the cluster.

IUCN considers that the **Wulong cluster** of the nominated property does not meet this criterion.

Criterion (ix): Ecological and biological processes

Libo is the only one of the three clusters nominated under this criterion. South China Karst contains an outstanding example of a continental tropical / sub-tropical karst ecosystem that evolved due to climatic and edaphic gradients. For example, the karst forests of Libo demonstrate a progression from evergreen broadleaf forest to evergreen mixed broadleaf-conifer forest. Ecological and biological processes are evident in the adaptation of plants to drought, rocky terrain, and calcium-rich soils. Once the adjacent area to Libo, Mulun Natural Reserve in Guangxi, is nominated in Phase 2 of the nomination considerably more justification could be given to this criterion. Moreover, inasmuch as karst is not just a physical process but a holistic merging of dynamic biological processes, this criterion could well be justified for the South China Karst as a whole if restoration efforts are successful.

IUCN considers that none of the clusters of the nominated property meets this criterion. IUCN considers, however, that the **Libo cluster**, in combination with the future proposed extension to include the Mulun Natural Reserve, has the potential to meet this criterion.

Criterion (x): Biodiversity and threatened species

Libo is the only one of the three clusters nominated under this criterion. Due to its climatic conditions, karst landscapes and altitude, the biotic communities in Libo generally exhibit high diversity and endemism. Some 41 plant species and 48 animal species are endemic to the karst landscapes of Libo, while around 17 species are endemic to karst caves. The karst forests of Libo were also formerly suitable habitats for a number of threatened species, but populations are either non-existent or small and thus no longer considered viable. While Libo's biodiversity compares favourably to other sub-tropical karst regions and is comparable with the forested karst regions of Southeast Asia, it cannot compete with other

more tropical karst regions. Despite the high biodiversity values of the forests of Libo, its karst features and processes are thus the predominant ones that stand out at the global level and are consistent with the values of the other clusters in the nomination.

IUCN considers that none of the clusters of the nominated property meets this criterion.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **inscribe** the **Shilin and Libo clusters** of the South China Karst, China, on the World Heritage List on the basis of criteria (vii) and (viii).

IUCN recommends that the State Party be requested to consider this as Phase 1 of a larger World Heritage nomination, and to consider whether the extent of subsequent phases of the entire series could be rationalized into a smaller number of sites and a single phase of nomination rather than two phases (see section 5.2). The potential application of criterion (ix) should be considered in relation to the entire series that is eventually proposed.

IUCN recommends that the World Heritage Committee **defer** the examination of the nomination of the **Wulong cluster** of the South China Karst, China, to the World

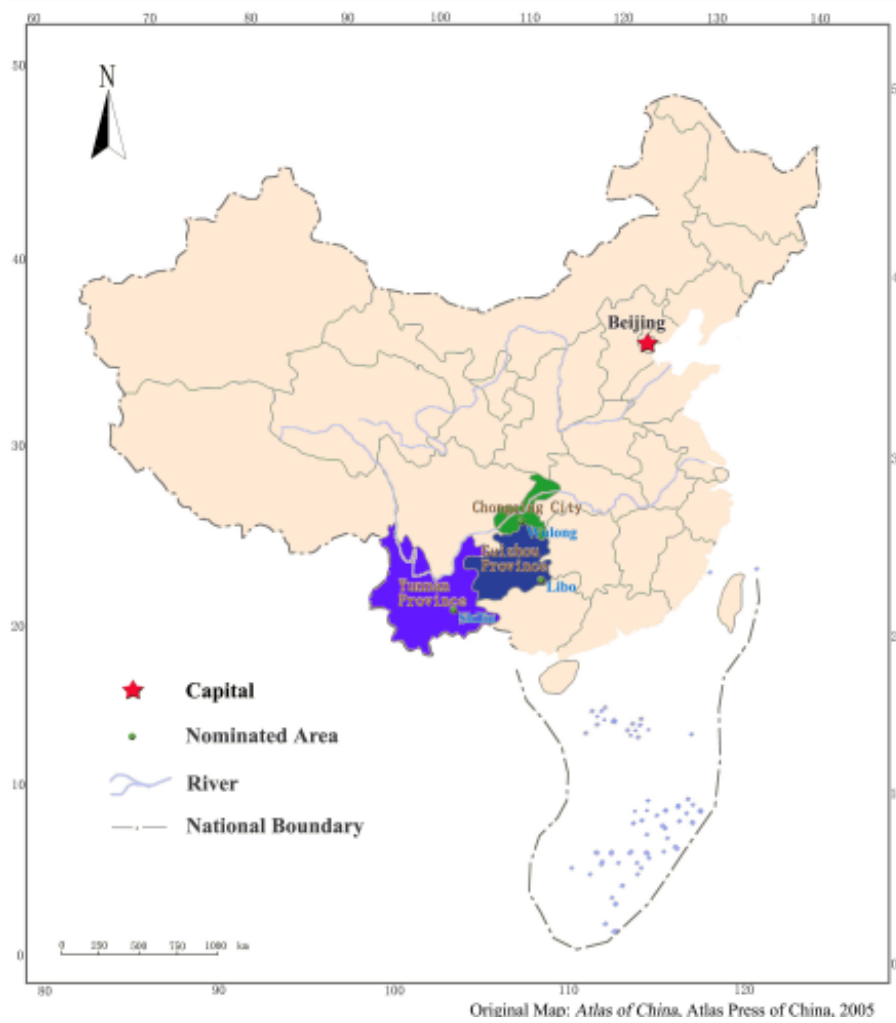
Heritage List on the basis of criteria (vii) and (viii) to Phase 2 of the nomination to allow the State Party to further consider whether it is of sufficient significance relative to other future extensions and – if so – to reconsider its boundaries.

IUCN also recommends that the World Heritage Committee urges the State Party to continue its efforts to expand and refine buffer zones to protect catchments upstream of the nominated property, and in particular to ensure that the necessary long-term protection and management of catchments be put in place.

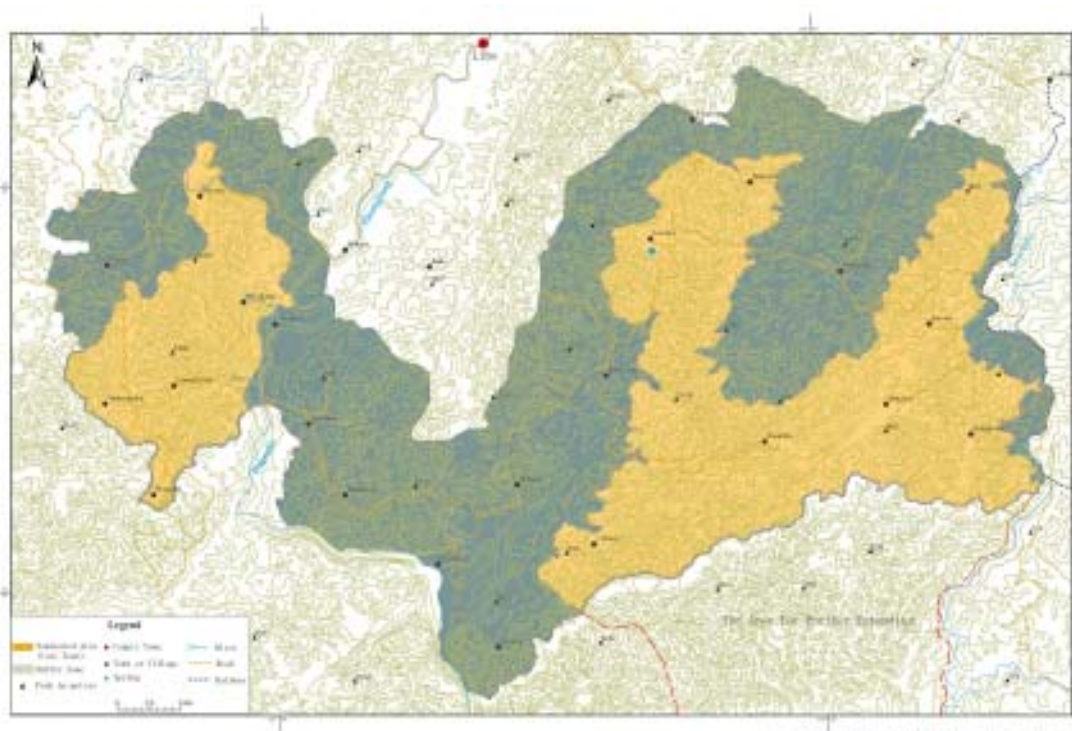
IUCN further recommends that the World Heritage Committee welcomes the recognition of the importance of the meaningful involvement of local people in the management of the nominated property, and requests that particular consideration and attention is given in developing Phase 2 of the nomination to the further involvement of local people and the maintenance of the traditional practices of the indigenous communities concerned.

IUCN finally recommends that the World Heritage Committee welcomes the intention of the State Party of China to discuss transnational aspects of the nomination with the State Party of Viet Nam, and urges the States Parties to ensure that this is considered prior to any further phase of nominations.

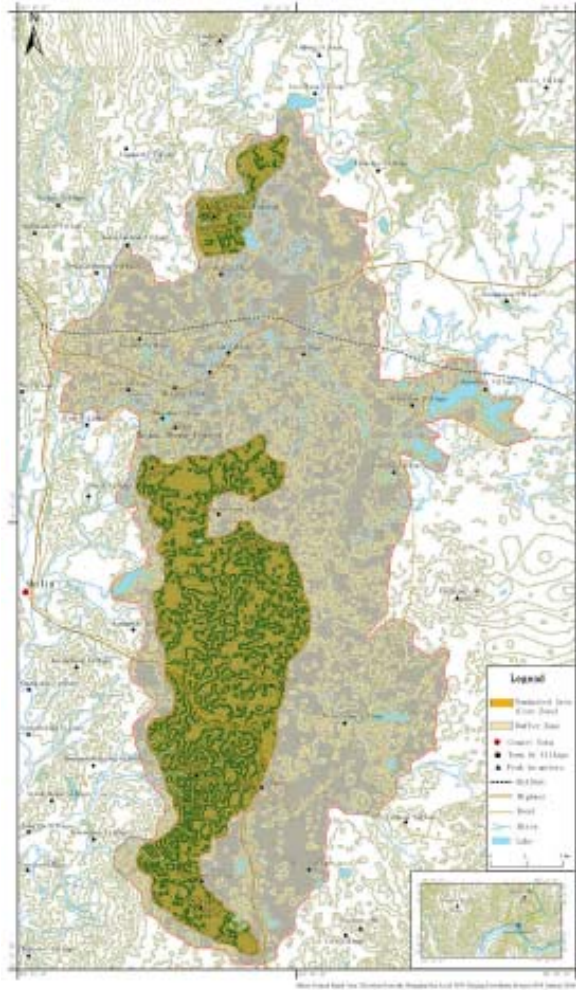
Map 1: Location of nominated property



Map 2: Details of the nominated Libo cluster



Map 3: Details of the nominated Shilin cluster



Map 4: Details of the nominated Wulong cluster

