LUNAN »SHILIN« (STONE FOREST) HUMAN IMPACT AND PROTECTION OF (EVENTUAL) WORLD HERITAGE SITE (YUNNAN, CHINA)*

LUNANSKI »SHILIN« (KAMNITI GOZD), VPLIV ČLOVEKA IN VARSTVO (MOREBITNEGA) OBJEKTA SVETOVNE NARAVNE DEDIŠČINE (YUNNAN, KITAJSKA)

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Izvleček

Andrej Kranjc & Hong Liu: Lunanski »Shilin« (Kamniti gozd), vpliv človeka in varstvo (morebitnega) objekta svetovne naravne dediščine (Yunnan, Kitajska)


Ključne besede: geomorfologija krasa, vpliv človeka, škraplje, shilin, Lunan, Yunnan, Kitajska.

Abstract

Andrej Kranjc & Hong Liu: Lunan »Shilin« (Stone Forest), human impact and protection of (eventual) World Heritage Site (Yunnan, China)

The Chinese expression »Shilin« (stone forest) is becoming an international term meaning megakarren, that is a »forest« of intensively corroded limestone pinnacles. The best known is Shilin near the town of Lunan. The first known description of Shilin is from 1382. Shilin is very important tourist site. Modern tourism began to develop in 1980, in 1999 the number of visitors reached over 2 million. In 1981 the whole area (350 sq. km) was protected. Under the auspices of the National Ministry of Construction material is being collected for an application to inscribe Shilin into the list of World’s Natural Heritage at UNESCO. Related to human impact the most important threats are: exploitation (destruction) of limestone pinnacles as a source of rock material; the pressure of population towards the protection zone due to their increase (need for new building plots); agriculture (farming and stockbreeding) connected to soil erosion and underground water pollution (use of fertilisers); fast growth of visitor numbers. The Shilin administration introduced different protection measures: ban on rock (limestone pinnacles) exploitation in the protection zone (orientation towards afforestation); construction of new tourist facilities out of the core zone (and demolition of some of them in that zone); establishment of a special protection department within Shilin management (18 person); education of »special voluntary rangers« - recruited among highly respected persons of villages and towns in the region.

Key words: karst geomorphology, human impact, megakarren, shilin, Lunan, Yunnan, China.
The Chinese expression “shilin” (shi = stone, lin = forest) is slowly becoming an international term meaning a kind of “megakarren”, that is a “forest” of intensively corroded limestone pinnacles up to some ten meters high. Yuan (1988) defined it as: “a complex landscape consisting of dense rock spires having a variety of shapes separated by numerous dissolution widened fractures. The surfaces of the spires and walls of the grikes exhibit vertical flutes (karren). The spires are commonly about 20 m high although the highest reach 50 m. The upper surfaces of the spires are modified by dissolution by rain water.” According to Waltham (1997) there are two types of pinnacle karst, so-called “pinnacle (normal) karst” and “shilin” or “stone forest karst”. While the first one is typical of steep slopes of high limestone mountains, the second one developed on single beds of gently dipping, solid limestone on the levelled top plateaux of southern China. The Dictionary of Modern Geography (Zu 1990) defined shilin as a special kind of high stone teeth with vertical solutional troughs paralleling the vertical rock surface, where columns commonly 20 m high, even 50 m high, were formed by the water within the loose sediments (Song & Li 1997).

The best and the first known (in literature) shilin is that one near the town of Lunan (Fig. 1, 2). But there are several shilins round Lunan and they can be found not only in Yunnan but also in the other provinces of China, as Guizhou, Hubei, Hunan and Sichuan shilins are known (altogether they cover about 900 km²) (Fig. 3). In the karstological literature in Central Europe the term “Steinwald” (i.e. stone forest in German language) is mentioned in Denes Balazs’s report of his visit to Karst in China in the years 1958 and 1959. He included pictures of a natural bridge in Lunan (Tienschengtschiao), map of the Zhiyun Cave and he writes about “the world famous Schiling (Steinwald) in Lunan County (Balazs 1960). The first detailed description of Lunan Shilin in Slovene karstological literature was written by Habič (1980).

Later, due to the bilateral projects between Yunnan Geographical Institute and Karst Research Institute, Postojna more reports on this and other shilins have been published in Slovene karst literature (Šebela 1996; Knez 1997; Zupan Hajna 1997; Chen et al. 1998). From some other karst landscapes in the world features similar to shilin (or sometimes even the same as shilin) were described. At some places we can speak about a real shilin; some described features are similar but different and have different names (i.e. tsingy in Madagascar, Salomon 1997). More and more as we are acquainted with karst regions of the world, more examples of pinnacle or similar karst features are known. There are examples from America (Sierra de San Luis Potosi, Mexico, Sierra de los Organos, Cuba), Africa (Kouilou near Mombassa), and Asia (Mulu in Sarawak, Mt. Kajjende in Papua New Guinea) (Ford et al. 1997). In Europe the most often cited are Montpellier-le-Vieux, France (“relief ruiniforme” in dolomites), Ciudad Encantada (Fig. 4) and El Torcal (Fig. 5) in Spain, and “rocks” (more the result of erosion in different rocks) in the Polish Jura Mountains (Fig. 6). These are similar features in appearance but in origin and evolution are different. So we fully agree with the statement of H. Trimmel (1997), that “the term stone forest should be restricted to the classical sites within southern China”.

The best known and we can say classical shilin is Shilin near the town of Lunan (former “xian” - county of Lunan, now Shilin), 90 km SE from the Yunnan capital Kunming, designating the geographical name. Its geographical position is 24° 30’ N and 103° 20’ E, at 1750 m above sea level. Mean temperature is 16.3° C with 936 mm of precipitation per year (Zhang 1984). This shilin is the best known and usually when referring to “shilin” one thinks of Lunan’s Shilin. The
Fig. 1: The location of Lunan Shilin (Huang & Liu 1998).
Sl. 1: Lega lunanskega Shilina (Huang & Liu 1998).

Fig. 2: Lunnan Shilin, carvings in the rock mean Shilin (photo A. Kranjc) (page 29).
Sl. 2: Lunanski Shilin, v skalo vklesani pismenki pomenita kamniti gozd (foto A. Kranjc) (na strani 29).

Fig. 4: Pinnacle “Mushroom” in Ciudad Encantada (Cuenca, Castilla - La Mancha, Spain). The influence of lithology upon the shape is clearly visible. (photo K. Kranjc) (page 29).
Sl. 4: Steber “Goba” v Ciudad Encantadi (Cuenca, Castilla - La Mancha, Španija), na katerem je lepo viden vpliv litologije na obliko. (foto K. Kranjc) (na strani 29).
Fig. 3: Distribution of shilins in South China (Song 1986).
Sl. 3: Shilini na južnem Kitajskem (Song 1986).

The word shilin was first written down by the ancient great Chinese poet Qu Yuan (about 340 - 278 BC) in his poem “Ask Heaven” (Pan & Ji 1997). The well known description of Shilin is from 1382 (Wang et al. 1994). According to Lu Lian Zhou Zhi (1573-1619) there was a temple on a karst hill nearby the “HEMO” station of Naigu Shilin ancient paths, which had become the site of Buddha worship for the local people. Man began to excavate the Ziyun Cave in 1614 and placed a stele at the entrance. In this period also the tourist path was constructed round Shilin (Song 1995). Xi Xiake (1586 - 1641), famous geographer and karst researcher, travelled to Yunnan in 1638. Because his “Yunnan Travel Diary I” is lost, it is impossible to recognise his route and his impressions in detail. From the remnants of his travel notes it is possible to presume that Xi Xiake visited Shilin. The great philosopher and scholar Gu Yanwu (1613-1682) gave the first convincing description of Shilin. This period can be called the early discovery phase.

Fig. 5: View of El Torcal de Antequera (Andalucía, Málaga, Spain). The height of the central pinnacle is about 20 m. (photo A. Kranjc) (page 31).
Sl. 5: Pogled na El Torcal de Antequera (Andalucía, Málaga, Španija). Višina srednjega stebra je okoli 20 m. (foto A. Kranjc) (na strani 31).

Fig. 6: The rock Grodzisko (Jerzmanowice, Województwo małopolskie, Poland) (photo A. Kranjc) (page 31).
Sl. 6: Skala Grodzisko (Jerzmanowice, Województwo małopolskie, Poljska) (foto A. Kranjc) (na strani 31).
Fig. 8: Small Shilin at Lunnan, a real park (photo A. Kranjc).

Sl. 8: Lunanski Mali Shilin urejen kot park (foto A. Kranjc).

Fig. 10: Wenbishan Shilin - fallen pillar is an easy accessible source of rock material (photo A. Kranjc).

Sl. 10: Wenbishan Shilin - prevrnjen steber je lahko dostopna zaloga kamna (foto A. Kranjc).
The second phase can be called early tourism development phase during which exploitation, protection and scientific research have developed. In 1931, the chairman of Yunnan Province, Yun Long visited Dadeishui waterfall with the government officials and his family and enjoyed the Shilin landscape on the way home. He wrote “Shilin” to describe the unique and magical stone forest landscape. He set up a special fund for pavilions, paths and villa construction there, and appointed regional staff to manage them. These were the earliest tourism facilities in Shilin scenic area. In the 30’s of the twentieth century, Beijing University, Qinghua University and Nankai University moved to Kunming due to the war against Japan; there many scholars have made the research of Yi nationality culture in this area and also of Shilin (Ma 1936) (Fig. 7). In 1944, the provincial government set aside a sum of money to build a villa, and assigned a full-time officer and 20 staff to manage house property and afforestation. At that time, Shilin was yet not opened to the public. The visitors are all government officials and rich men, the sightseers were few, but have left many art works of carved stone behind. The Shilin management office
was set up in 1951 under the leadership of Yunnan province and Lunan county government. In the next year the Shilin management department was set up, which was responsible for the management of Shilin. In 1953, Shilin got the first international visitor, a Soviet delegation, and premier Zhou Enlai made a special trip to Shilin and gave his approval for exploitation of Shilin. Since that time the government has invested in building tourist route, making the stone tables, planting flowers and trees, allowing Shilin to receive more tourists. From 1961 to 1965, different levels of administration have paid attention to the exploitation of Shilin. Sooner or later state leaders have visited Shilin giving the area a high reputation, and the number of visitors to Shilin landscape was increasing.

Unfortunately, the culture revolution, from 1966 to 1976, caused a lot of damage to tourism of Shilin. Not only the buildings were demolished, but also some scenery stones were damaged. Deforestation occurred in some places.

Since 1979, the scenic area of Shilin has stepped into a quick development phase, the first development and protection promoted phase, which can be called modern tourism phase. The government has recognised the scientific value of Shilin landscape, assuming that its exploitation will have a great influence on local economy and culture, so they began to look to strengthen the protection of Shilin and its environment, including its restoration. In 1980, the Administrative Office of Shilin Scenery (Bureau of Shilin Management) was set up; it was divided into five different departments. There were garden and forestry, agrarian pre-plan, tourist service, environment protection, and publicity departments. It has organised experts to carry out the work of fully systematic investigation and estimation. In 1981 Shilin was listed as a province natural protected area covering 350 km², mainly protecting the Shilin landscape and its geological phenomena and in 1982 it became a National Park.

In 1987, the state ministry of construction formally approved “The Overall Plan of Lunan Shilin Scenic Area”. It defines the area of Shilin protected area (350 km²), and the whole area was divided into three zones with different protection levels. The first level includes Major and Minor Shilin Scenic areas (Fig. 8), Naigu Shilin area, Ziyundong Cave area, Qifongdong Cave area, Changfu Lake area, Yuefu Lake area and Dadeishui water fall area. The whole surface of the first level has 15.76 km² (later it was adjusted to 18.5 km²). The second level areas are the first levels’ buffer zone, or we can say it is an environmental transition zone, occupying 28.14 km². The third protection level, similarly, is the buffer zone of second level areas, covering 306.1 km² (Fig. 9). Since then, they have made the detailed plan of scenic areas, which let the management of Shilin Scenic area move into a next phase. By the “Protection Act of Lunan Shilin Scenic area” the exploitation and protection of Shilin was set into the legal system (Wang et al. 1995).

In 1988, Shilin was listed as a state-level scenic area. Common people little by little understood the value of Shilin landscape and its scenery was becoming more and more known. From 1990 to now, the Shilin Management Bureau has paid more attention to the protection of Shilin landscape and its environment.

A lot was done to expand and to improve tourist facilities too. In 1986 Naigu Shilin was opened to the public and in the same year already it had over 46,900 visitors. Later on their number declined. In the same year also Dadeishui water fall area was opened to the public and has had 55,000 visitors that year. In 1988 Ziyundong Cave was opened and there were 64,500 of visitors. In the period 1980 - 1990 Shilin Scenic area has been visited by 10 million tourists and in 1999 alone by more than 2 million.
Therefore safeguarding and protecting of Shilin is becoming more and more important. Under the auspices of the “National Ministry of Construction” they began to collect material for the preparation of an application to inscribe Shilin into the list of World’s Natural Heritage at UNESCO. The task was in charge of Prof. Xiong Rouwei from Yunan normal University and Prof. Xie Lingao from Beijing University within the co-operation of Yunnan normal University, Government of Shilin county, and Beijing University. In 1995 the International Symposium for Lunan Shilin to Apply for World Natural Heritage Status with the aim to confirm the justification of Shilin’s inscription into the World Heritage list was organised (Song et al 1997). During this event number of Chinese and most eminent western karstologists evaluated Shilin from very different points of view. Concluding remark by Zhang Yaoguang, the member of Chinese Academy of Sciences was: “Lunan Shilin therefore has high values both to science and economy. It must be designated as a World Natural Heritage Site” (Song et al 1997, 95).
It is self-evident that such a site needs protection and safeguarding measures. Some have been shown in the previous text already. With the increase of number of visitors human impact problems are growing too. The most important are:

- quarrying,
- growth of population (urban growth),
- agriculture and stock breeding (pollution),
- soil and water loss (pressure on local water supply),
- mass tourism.

Quarrying has been a knotty problem of long standing in the management of Shilin. Although the Management Bureau has repeatedly forbidden the exploitation (destruction) of limestone pinnacles as a source of rock material (Fig. 10), it could not stop it completely. In 1999, the county government and Shilin authorities made the big decision to stop it. They not only forbid quarrying activities inside the protected area, but ask the people who previously quarried to afforest the land and to carry out ecological restoration works in those areas.

The second important threat is the pressure of population towards the protection zone due to its increase. This can be seen through the pressure for new building plots (the inhabitants inside protected area occupy more and more land) and through the intensification of agriculture and its needs (farming and stockbreeding). The soil and water loss phenomena are becoming serious, the fertilisers used are also a potential pollution source of underground water.

The third impact is directly by mass tourism, due to the fast growth of visitor numbers which certainly makes a great pressure on environment and landscape protection work. In order to adapt the requirement of tourism, there have been built some tourist service facilities around the outer-ring of Shilin scenic spots, which is partially in contradiction to protection of the original Shilin landscape panorama. The relationship between protection and exploitation still needs further harmonisation. In order to adapt the application work, Shilin Management Bureau and government of Shilin county has decided to demolish some buildings and facilities which are inside scenic area and to construct new tourist facilities out of the core zone.

Management Bureau and Shilin Administration prepared special protection plans and measures, including special organisation of human resources too. Besides the delimitation of sectors with different steps of protection (core zone, buffer zone ...), the Shilin Administration introduced different protection measures. They have set up a special Environmental Protection Department under the Shilin Management Bureau. It consists of 18 persons, specially engaged in landscape resources and environmental resources protection. This department is under the leadership of a deputy director of the bureau. Each of the team is in charge of the protection work of certain areas. They all have high school education. Moreover, the head or a person with high reputation of every village or township in the region is also engaged as a special ranger (volunteer), who is responsible for preventing the inhabitants damaging stone and nature resources. When they find out or hear something happening in a protected area, they go there to check it out and report to the leader of the management bureau. Interdiction of rock (limestone pinnacles) exploitation in the protection zone has been mentioned already. These special rangers are entitled to give advice to stone pillars destroyers. If the advice is not respected, they have the right to confiscate their transport tools and equipment. And even more, they have the authority to fine the destroyers up to 5000 Yuan. But for the bigger affairs all the leaders of Shilin directorate need to deal with and to harmonise it.
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Povzetek


Vpliv človeka se kaže predvsem v izkoriščanju (destrukciji) kamnitih stebrov kot viru surovin, v pritisku prebivalstva na zaščiteno cono zaradi njihovega naraščanja (potreba po novih gradbenih parcelah), v kmetijski (poljedelstvo in živinoreja) dejavnosti, povezani z erozijo prsti in onesnaževanjem podzemeljske vode (uporaba umetnih gnojil) in v hitrem naraščanju števila obiskovalcev.

Razen omenjene razdelitve na več različno strogo zaščitenih območij, so povzeli vrsto ukrepov: stroga prepoved izkoriščanja kamna v zaščitenem področju (usmerjanje k pogozdovanju), gradnja turističnih naprav izven ožjega območja (in odstranitev takih naprav iz tega območja), ustanovitev posebnega oddelka za varovanje (18 oseb) v okviru uprave Shilina, pridobitev visokih in spoštovanih oseb posameznih naselij za “specialne rangerje” - prostovoljne sodelavce uprave Shilina.