IUCN Conservation Outlook Assessment 2017 **(archived)**
Finalised on 08 November 2017

Please note: this is an archived Conservation Outlook Assessment for Chengjiang Fossil Site. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Chengjiang Fossil Site

SITE INFORMATION

Country:
China
Inscribed in: 2012
Criteria:
(viii)

Site description:

A hilly 512 ha site in Yunnan province, Chengjiang's fossils present the most complete record of an early Cambrian marine community with exceptionally preserved biota, displaying the anatomy of hard and soft tissues in a very wide variety of organisms, invertebrate and vertebrate. They record the early establishment of a complex marine ecosystem. The site documents at least sixteen phyla and a variety of enigmatic groups as well as about 196 species, presenting exceptional testimony to the rapid diversification of life on Earth 530 million years ago, when almost all of today's major animal groups emerged. It opens a palaeobiological window of great significance to scholarship. © UNESCO

SUMMARY

2017 Conservation Outlook

Good

The site is protected under law and relatively effectively administered by a management authority with the guidance of comprehensive management plans. Former low-level threats have been overcome, but new threats such as the illegal collection of fossils and future demand for more infrastructure development associated with growing visitor numbers will require careful management.

Current state and trend of VALUES

Good
Trend: Stable

The current state of the outstanding universal palaeobiological-geological values of the property is good and the trend is stable. The site is relatively limited in area and the fossil localities are inherently vulnerable to disturbance or damage. However, these have not proved to be a problem for protection of the site and its fossils to date, and no future problems are envisaged given the effective protection and management regime of the property. The property benefits from having no permanent resident population and currently relatively few visitors, many of whom are scientists. There is, however, evidence (internet-based, at least) of illegal collection and sale of fossils from associated localities outside the site, which so far has not been fully addressed and which is of concern.

Overall THREATS

Low Threat

Current threats are few and a likely substantial increase in visitor numbers in the near future is the major potential threat to the property. Current threats from inappropriate tourism infrastructure development and inappropriate use of introduced species in re-forestation are partly recognized and should be mitigated. Former mining activities occurred in the buffer zone only. However,

illegal collection and sale of fossils is a key threat to the site, which so far has received little attention. Overall, the threat level to the outstanding geological values of the site is low.

Overall PROTECTION and MANAGEMENT

Mostly Effective

Overall the effectiveness of management of the property can be assessed as mostly effective. The protection laws, management system, research and environmental monitoring are of excellent standard. Funding and staffing appear adequate for present needs. Inappropriate visitor infrastructure development has caused concerns in the past, and it is currently uncertain what associated effects the newly built Museum will have on the site. The management authority will need to be vigilant regarding potential impacts from any future increase in visitation levels. There should be more engagement with the local community and more transparency about actions taken to protect the site. Improved protection is desirable for some fossil localities in the area surrounding the property.

FULL ASSESSMENT

Description of values

Values

World Heritage values

- **An exceptional fossil record of the rapid diversification of life on Earth during the early Cambrian period, some 520 million years ago**
  Criterion:(viii)

  The palaeontological evidence of the site is unrivalled for its rich species diversity for early Cambrian times. To date at least 16 phyla, plus a variety of enigmatic groups, and at least 250 species have been documented. Taxa recovered include algae, sponges and cnidarians along with numerous bilaterian phyla, including the earliest known chordates. The quality of fossil preservation is exquisite, including both the soft and hard tissues of animals with hard skeletons, along with a wide array of organisms that were entirely soft-bodied and, therefore, relatively unrepresented in the global fossil record. The fossils and rocks of the property, together, present the most complete known record of an early Cambrian marine community (Babcock et al., 2001; China, 2011; Dzik, 2004; Hagadorn, 2002; IUCN 2012; Hou et al. 2004; Hou et al., 2017).

Assessment information

Threats

Current Threats

Low Threat

Current threats are few and can be rated as low to high in terms of their impacts. Mostly, they relate to former activities and impacts and effective mitigation measures are now partly in place.

► Mining/ Quarrying

Very Low Threat
Outside site

Until 2004 phosphate mining occurred in the buffer zone and mines were closed in 2008. The complex process of mine rehabilitation has begun but will take many years to complete (36COM. 8B.9; China, 2011; IUCN 2012).

► Other Ecosystem Modifications

Low Threat
Inside site

Since 1997 there has been replanting as part of a forest restoration programme. Introduced species were used but recently this practice has been replaced by the use of native plants (IUCN, 2012).

► Tourism/ Recreation Areas

Low Threat
Inside site, localised(<5%)
Outside site

Construction of a walkway involved deep excavation of a fossil locale and a museum was built over the site of the first fossil discoveries (36COM. 8B.9; China, 2011; IUCN 2012; IUCN Consultation, 2017).

► Other

High Threat
Inside site, localised(<5%)
Outside site

So far, there is no effective action against illegal fossil collecting, which causes damage on the site and the loss of valuable fossil material (IUCN

Consultation, 2014). However, the threat is largely outside the strict confines of the World Heritage site boundary, in the immediately surrounding areas that have the same type of rock, and in areas to the west – for example in the Haikou district.
A check of fossils for sale on the web indicates that Chengjiang material is still being illegally offered for purchase on the open market, with prices of US $1000+ dollars for some specimen not uncommon.

Potential Threats

Low Threat

A significant increase in visitor numbers and the development of relevant infrastructures in the near future is the major potential threat to the property.

► Tourism/ visitors/ recreation

Low Threat
Inside site, widespread(15-50%)
Outside site

Visitor levels were low at the time of inscription (4-5,000 annually), but were expected to grow significantly to around 30-40,000 per annum (36COM. 8B.9; China, 2011; IUCN, 2012). Visitor numbers are now at 6-8,000 annually, and are expected to grow to about 100, 000 with the continuous improvement of supporting facilities outside the site (IUCN Consultation 2017).

Protection and management

Assessing Protection and Management

► Relationships with local people

Some Concern

There has been little involvement with the local community (IUCN, 2012). A better engagement is needed to ensure local communities understand the protection policy and are able to participate in protection activities.

► Legal framework

Mostly Effective

The property and its fossils are protected by national and provincial legislation. Enforcement is generally good; however, there continues to be some concern (see 36COM. 8B.9; China, 2011; IUCN, 2012) over the illegal trade of fossil collected, from scientifically important, closely associated localities outside the World Heritage site.
In order to increase protection of the World Heritage site, on 26th May 2017 the 34th meeting of the Standing Committee of the 12th People's Congress of Yunnan Province approved 'Yunnan province Chengjiang fossil site world natural heritage protection regulation'. On 1st July 2017 the implementation of this regulation started, to further strengthen the protection afforded to the Chengjiang fossils (IUCN Consultation, 2017).

► Enforcement

Mostly Effective

While enforcement within the Word Heritage site appears to be highly effective, illegal collecting of fossils is still a serious concern from associated sites around the World Heritage site, with many potentially important fossils being effectively lost to science.

► Integration into regional and national planning systems

Data Deficient

Data deficient

► Management system

Highly Effective

The management system is rated as sufficient for current needs. Three management plans apply in the property (IUCN, 2012). The management committee of the WH site overlaps with that of the Geological Park and provincial Nature Reserve (IUCN Consultation, 2017).

► Management effectiveness

Mostly Effective

Existing staffing and financial resources are sufficient to provide an effective response to management needs under current types and levels of demand (IUCN, 2012).

▶ Implementation of Committee decisions and recommendations

Some Concern

The only decision adopted by the World Heritage Committee on this site was the one at the time of the inscription (World Heritage Committee, 2012). In that Decision the Committee requested the State Party to "ensure proactive tourism management in anticipation of increased future visitation" (World Heritage Committee, 2012) and it appears that some measures have been undertaken in that regard (IUCN Consultation, 2017). It is, however, unclear whether the Committee's request to "ensure any proposed infrastructure development and excavations are sympathetic to the site’s values and are subject to rigorous prior impact assessments" has been addressed.

▶ Boundaries

Highly Effective

The boundaries are appropriate. They are well delimited and signed (IUCN, 2012).

▶ Sustainable finance

Mostly Effective

Current funding is adequate (IUCN, 2012).

▶ Staff training and development

Mostly Effective

The 13 permanent staff and 16 part-time staff were considered adequate to cope with the management requirements at the time the Chengjiang fossil site was inscribed on the World Heritage List (IUCN, 2012). These staff numbers have now been increased to 27 permanent staff and 22 part-time staff (IUCN Consultation, 2017). A continuous programme of staff training should be maintained.

► Sustainable use

Data Deficient

.

► Education and interpretation programs

Mostly Effective

Very good curation and display of fossils in a purpose-built museum (IUCN, 2012) that is central on the site and under the auspices of Academia Sinica, and historically there has been a very good display at the County Museum in Chengjiang town. Now (2017), a further, new museum relating to the Chengjiang site and its fossils is being built under the direction of the regional provincial government, together with associated facilities earmarked for scientific research work. This new museum is sited between the buffer zone and Fuxian Lake. Establishment of these new developments is in its infancy, but some at least, and possibly all, of the fossil collections in the County Museum in Chengjiang town have been earmarked for transferral to the new museum.

► Tourism and visitation management

Mostly Effective

Low numbers of tourists visit the property and most international tourists are scientists. Interpretation is excellent (IUCN, 2012). However the number of tourists is projected to increase annually, to 100, 000 (IUCN Consultation, 2017), and the establishment of a new museum will have implications for existing Museum displays and collections (especially, the County Museum in Chengjiang town).

► Monitoring

Some Concern

The monitoring programme is extensive and well conducted (IUCN, 2012).

► Research

Highly Effective

The property has been the subject of intensive research since the first fossil

discovery was made in 1984 and first reported in 1985 (Zhang & Hou, 1985). Recent high-profile Chengjiang research papers (e.g., Ma et al., 2012; Tanaka et al. 2013; Ma et al., 2014) made further important breakthroughs in evolutionary studies. More recent references include the key book Hou, Siveter & Siveter et al. 2017 and also Cong et al. 2017 . Cutting edge research on the fossils from this site and surrounding areas will continue into the very distant future.

Overall assessment of protection and management

Mostly Effective

Overall the effectiveness of management of the property can be assessed as mostly effective. The protection laws, management system, research and environmental monitoring are of excellent standard. Funding and staffing appear adequate for present needs. Inappropriate visitor infrastructure development has caused concerns in the past, and it is currently uncertain what associated effects the newly built Museum will have on the site. The management authority will need to be vigilant regarding potential impacts from any future increase in visitation levels. There should be more engagement with the local community and more transparency about actions taken to protect the site. Improved protection is desirable for some fossil localities in the area surrounding the property.

▶ Assessment of the effectiveness of protection and management in addressing threats outside the site

Mostly Effective

More planning, management effort and protection are required for the significant fossil localities outside the property that provide scientific context for the fossil assemblage in the property (IUCN, 2012). The fact that ‘Chengjiang fossils’ are still (2017) being offered for sale internationally on the ineternet is testimony to the continuing removal of fossils from outside the confines of the site.

State and trend of values

Assessing the current state and trend of values

World Heritage values

▶ **An exceptional fossil record of the rapid diversification of life on Earth during the early Cambrian period, some 520 million years ago**
Good
Trend:Stable

The site and its fossil localities are well protected and managed. There are no undesirable or harmful pressures on the property at present and none is expected. Future growth in visitor numbers could bring demand for more infrastructure development and consequent impacts, which would require effective management intervention (36COM. 8B.9; China, 2011; IUCN, 2012).

Summary of the Values

▶ **Assessment of the current state and trend of World Heritage values**
Good
Trend: Stable

The current state of the outstanding universal palaeobiological-geological values of the property is good and the trend is stable. The site is relatively limited in area and the fossil localities are inherently vulnerable to disturbance or damage. However, these have not proved to be a problem for protection of the site and its fossils to date, and no future problems are envisaged given the effective protection and management regime of the property. The property benefits from having no permanent resident population and currently relatively few visitors, many of whom are scientists. There is, however, evidence (internet-based, at least) of illegal collection and sale of fossils from associated localities outside the site, which so far has not been fully addressed and which is of concern.

Additional information

Benefits

Understanding Benefits

► Importance for research

The property is one of the world’s most significant fossil sites and of great importance to the science of palaeontology and evolution. Discovery and study of the fossils here have provided the best known picture of early Cambrian marine life and have revolutionized our understanding of the evolution and diversification of life on Earth. The fossil record is extremely well researched and widely reported in the scientific literature and the fossil assemblage is generally well curated, protected and displayed.

Summary of benefits

Although it is a relatively small site with very specific scientific and conservation values, the property provides effective protection to a natural palaeobiological-geological landscape of global importance, and study of its fossil assemblage has revolutionized our knowledge of the evolution and diversification of life on Earth, specifically with respect to our understanding of the flowering of early animal life some 520 million years ago.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	.		.

REFERENCES

№	References
1	36COM. 8B.9
2	Babcock, Loren E. et al., 2001. The Chengjiang Biota: record of Early Cambrian diversification of life and clues to exceptional preservation of fossils. GSA Today (February 2001): 4-9.
3	China, 2011. Ghengjiang Fossil Site, China World Heritage nomination.
4	Cong Peiyun,, Ma Xiaoya, Williams M., Siveter David J., Siveter Derek J., Gabbott S.E., Zhai Dayou, Goral Tomasz, Edgecombe G.D. & Hou Xianguang. 2017. Host specific infestation in early Cambrian worms. Nature Ecology & Evolution. Doi: 10.1038/s41559-017-0278-4.
5	Dzik, Jerzy 2004. Review of: Hou, Xian-Guang et al. 2003. The Cambrian fossils of Chengjiang, China: the flowering of early animal life. Journal of Sedimentary Geology.
6	Hagadorn, James W., 2002. Chengjiang:early record of the Cambrian explosion. Chapter 3, pp. 35-60 in: Bottjer, D.J. et al. (eds.), 2002. Exceptional fossil preservation: a unique view of the evolution of marine life. Columbia University Press, New York.
7	Hou Xian-guang, Siveter, David J., Siveter, Derek J., Aldridge, Richard J., Cong, Pei-yun, Gabbott, Sarah E., Ma, Xiao-ya, Purnell, Mark A., Williams, Mark. 2017. The Cambrian fossils of Chengjiang. The flowering of early animal life. Wiley-Blackwell, 316 pp, Oxford.
8	Hou, X. et al., 2004. The Cambrian fossils of Chengjiang, China—The Flowering of Early Animal Life. Blackwell Publishing, Oxford.
9	IUCN Consultation, 2017.
10	IUCN, 2012. Evaluation of the Chengjiang Fossil Site World Heritage nomination.
11	Ma, X. et al., 2012. Complex brain and optic lobes in an early Cambrian arthropod. Nature, 490: 258-261.
12	Ma, X. et al., 2014. An exceptionally preserved arthropod cardiovascular system from the early Cambrian. Nature Communications, 5: 3560. DOI: 10.1038/ncomms4560
13	Tanaka, G. et al., 2013. Chelicerate neural ground pattern in a Cambrian great appendage arthropod. Nature, 502: 364-367.

№	References
14	Zhang, W. & Hou, X. 1985. Preliminary notes on the occurance of the unusual trilobite Naraoia in Asia. Acta Palaeontologica Sinica, 24: 591-595.