IUCN Conservation Outlook Assessment 2014 **(archived)**
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Please note: this is an archived Conservation Outlook Assessment for Swiss Tectonic Arena Sardona. To access the most up-to-date Conservation Outlook Assessment for this site, please visit https://www.worldheritageoutlook.iucn.org.

Swiss Tectonic Arena Sardona

SITE INFORMATION

Country:
Switzerland
Inscribed in: 2008
Criteria:
(viii)

Site description:
TheSwiss Tectonic Arena Sardona in the north-eastern part of the country covers a mountainous area of 32,850 ha which features seven peaks that rise above 3,000 m. The area displays an exceptional example of mountain building through continental collision and features.excellent geological sections through tectonic thrust, i.e. the process whereby older, deeper rocks are carried onto younger, shallower rocks. The site is distinguished by the clear three-dimensional exposure of the structures and processes that characterize this phenomenon and has been a key site for the geological sciences since the 18thcentury. The Glarus Alps are glaciated mountains rising dramatically above narrow river valleys and are the site of the largest post-glacial landslide in the Central Alpine region. © UNESCO

SUMMARY

2014 Conservation Outlook

Good

The Swiss Tectonic Arena Sardona, which is an exceptional example of mountain building tectonics including the Glarus Overthrust, has a good conservation outlook overall thanks to the robustness of its values in the face of anthropogenic impacts, its relative inaccessibility, the appropriateness of the boundaries of the area and overall highly effective management.

Current state and trend of VALUES

Good
Trend: Stable

The site is an exceptional example of mountain building tectonics, including the Glarus Overthrust, as well as the exposures of the rocks below and above this feature which are visible in three dimensions. The site's geological values are in a good state and stable.

Overall THREATS

Very Low Threat

The site's World Heritage values are subject to only minimal threats. The robustness of its geological values and its effective management regime combine to minimize threats to its integrity.

Overall PROTECTION and MANAGEMENT

Highly Effective

The protection and management of the Swiss Tectonic Arena Sardona is overall effective to highly effective, in spite of a persistent funding gap in comparison to financial needs estimated at the time of inscription. There are, however, a number of ongoing management issues, including clarification of the

implementation of the monitoring plans. Due to its inaccessibility and the appropriateness of its boundaries, the site is not subject to significant threats originating from outside its boundaries.

FULL ASSESSMENT

Description of values

Values

World Heritage values

- **Exceptional example of mountain building tectonics**
  Criterion:(viii)

  The site provides is an exceptional example of mountain building tectonics and has been a key site for geological sciences since the 18th century. The clear exposure of the Glarus Overthrust is a key, but not the only significant, feature. The exposures of the rocks below and above this feature are visible in three dimensions and, taken together, have made substantial contributions to the understanding mechanisms of mountain building. Its geological features can be readily appreciated by all visitors. The site can be differentiated from other similar sites by the combination of the clear exposure of the phenomenon in a mountain setting, the access to rock samples deformed at various depths in the Earth’s crust, its history of study, and its ongoing contribution to geological sciences (SoOUV, 2008).

Other important biodiversity values

- **Forest, subalpine and alpine ecosystems with their associated flora and fauna**

  The site, which ranges from 570 to 3,257 m a.s.l. and occupies an area of 32,850 ha, comprises a wide range of subalpine and alpine ecosystems: Beech Fagus sylvatica and Beech-Silver Fir Abies alba forests up to 1,400 m, Silver Fir and Norway Spruce Picea abies forests with Swiss Mountain Pine

Pinus mugo and Rhododendron spp. between 1,400 and 1,500-1,800 m, and stands of Arolla Pine Pinus cembra and thickets of Green Alder Alnus viridis around the treeline at about 2,000 m. Above the treeline, there are meadows of Rusty Sedge Carex ferruginea, mat-grass pastures of Nardus stricta, and blue moorgrass evergreen sedge swards of Sesleria caerunata and Carex sempervirens with a rich accompanying flora. There are also alpine mires, raised bogs, seepage communities, and alluvial riparian zones with rare plant communities. Among them is Plaun Segnas Sut at 2,100 m altitude, once of Switzerlands largest mire landscapes. There are also extensive rock and scree areas, as well as 16 small diminishing glaciers, 20 alpine lakes and seven peaks above 3,000 m a.s.l. The flora of the site includes about 800 vascular plant species, 50 of which are nationally protected. The fauna includes many typical alpine mammal species, 85 species of breeding birds, 5 fish species, 2 amphibian and 6 reptile species, and a diverse invertebrate fauna (UNEP-WCMC, 2011). The site hence comprises forest and particularly mountain ecosystems of national importance and is part of a WWF/IUCN Global Centre of Plant Diversity (WWF and IUCN, 1994), but does not overlap with a WWF priority global 200 ecoregion (WWF, 2012), an Endemic Bird Area (BirdLife International, 2012a), Important Bird Area (Birdlife International, 2012b), or CI Global Biodiversity Hotspot (Conservation International, 2012). It has not been screened for Important Plant Areas yet (Plantlife International, 2012).

Assessment information

Threats

Current Threats

Very Low Threat

The robustness of the geological values of the site and the effective management regime combine to minimize threats to its integrity.

► Tourism/ visitors/ recreation

Very Low Threat
Inside site

Almost all tourism infrastructure (with the exception of several cabin mountain hotels and mountain huts) in the area is outside the actual site, and mass tourism is precluded by the inaccessibility of the terrain. Visitor numbers to the higher parts of the site are therefore relatively low, and disturbance and littering only poses a very low threat to the biodiversity values of the area (IUCN, 2008).

► Livestock Farming / Grazing

Low Threat
Inside site
Outside site

In 2002, ca. 2,700 cattle, 5,300 young stock, almost 7,000 sheep, 450 goats as well as 50 horses and donkeys seasonally used pastures inside the site (UNEP-WCMC, 2011). Cattle grazing on alpine meadows has lead to trampling and slope terracing, localized removal/degradation of the vegetation cover and increased frequency of landslides (IUCN, 2008). There is also a localized traditional agriculture (Swiss Federal Office of the Environment, 2006). Because of its rather local nature, this threat is assessed as a “low threat” although it may require a targeted management response.

► Temperature changes

Data Deficient
Inside site
Outside site

The 16 small glaciers within the site have been diminishing rapidly in the recent past (UNEP-WCMC, 2011), and rapid shifts in ecosystem structure and functioning in spite of only moderate changes in air temperature have been observed in nearly comparable ecosystems (e.g. Cannone et al. 2008). The exact extent and impact of climate change on the biodiversity values of the site, as well as its interaction with other factors, requires further research.

► Changes in traditional ways of life and knowledge systems

Data Deficient

Inside site
Outside site

Pastoralism and other types of traditional use of the ecosystems of the site is in decline, with steeper and less valuable areas increasingly released from grazing and the corresponding meadow ecosystems being taken over by scrublands (UNEP-WCMC, 2011). The exact extent and net impact of this trend on the biodiversity values of the site require further study.

► Commercial hunting

Very Low Threat
Inside site
Outside site

Traditional hunting is well established and controlled in the area (license requirement), and only poses a very low threat to its biodiversity values (IUCN, 2008). The same is true for logging which is carried out in small areas only (Swiss Federal Office of the Environment, 2006).

► War, Civil Unrest/ Military Exercises

Very Low Threat
Outside site

There are some firing ranges outside but close to the site, which present a low threat to its biodiversity values (IUCN, 2008).

► Other

Very Low Threat
Inside site
Outside site

In general, the geological values of the site are very robust against anthropogenic interference. Hammering for geological samples by hobby geologists at accessible outcrops like Lochsite needs to be controlled, which is reportedly being done in an effective manner (IUCN, 2008).

Potential Threats

Very Low Threat

Potential threats to the site’s values are minimal.

► Tourism/ Recreation Areas

Very Low Threat
Inside site
Outside site

In theory, the biodiversity values of the site could be threatened by large scale tourism infrastructure development, such as mountain skiing installations. However, the overall framework for nature and biodiversity conservation in Switzerland is considered sufficiently robust to preclude such developments (IUCN, 2008), and this threat is therefore considered minimal.

Protection and management

Assessing Protection and Management

► Legal framework and enforcement

Mostly Effective

The site has adequate legal protection, which consists of a mixture of federal, cantonal and local measures. The key features of the properties are included or being included into cantonal inventories of geological sites, which affords protection status to them. The ecosystems and biodiversity of the area are protected by ca. 30 national and another 80 cantonal and local PAs (UNEP-WCMC, 2011, Protected Planet, 2012)

► Relationships with local people

Highly Effective

The nomination of the site for World Heritage status was driven by the local communes, together with three Swiss cantons. There is a dedicated Delegates Assembly Committee which ensures effective continued participation of local people in the management of the site (UNEP-WCMC, 2011).

► Integration into regional and national planning systems

Mostly Effective

The site is well-integrated into regional and national planning systems: Each of the three cantons involved developed a master plan for the integrated management of the area, which was approved by the federal government and is binding to all authorities. A regional management plan was concluded in 2003 and was being implemented at the time of inscription (IUCN, 2008).

► Management system

Highly Effective

There is a central management plan for the site (Swiss Federal Office of the Environment, 2006). In addition, there are coordinated, binding cantonal master plans and the coordinating Delegates Assembly Committee. This setup was considered effective upon inscription of the site on the World Heritage list (IUCN, 2008).

► Management effectiveness

Mostly Effective

No formal management effectiveness assessment has been conducted for the site. Overall, management effectiveness was considered satisfactory at the time of inscription (IUCN, 2008).

► Implementation of Committee decisions and recommendations

Data Deficient

The only Committee Decision focusing on the site thus far has been Decision 32 COM 8B.14 (2008). This decision did not include any recommendations to the State Party.

► Boundaries

Highly Effective

The boundaries of the site were considered adequate at the time of inscription. It is well supported by stakeholders and follows geographic features, as well as the boundaries of existing protected areas. Because of

the topography of the area, there is no need for a buffer zone (IUCN, 2008).

▶ Sustainable finance

Mostly Effective

The total required annual budget of the site has been estimated at ca. USD 946,000 in 2008 (IUCN, 2008). The 2012 budget was ca. USD 538,000, which would equal a funding gap of 44%. The site is jointly funded by national (64%), cantonal (28%) and local authorities (5%), with additional contributions by private partners such as tourism associations. An intensified search for sponsors is foreseen as a priority activity in the 2012-2015 programme period (Geschäftsstelle IG TAS, 2012).

▶ Staff training and development

Highly Effective

The site itself has a small administration unit (2 employees on regular basis) and staff jointly managed by the three Swiss cantons and the municipalities with which it overlaps. Staff tasked with aspects of the site’s management take part in the training and development activities of these institutions, regularly Besides, local people have been trained as GeoGuides for the site, starting in 2011 (UNESCO Weltnaturerbe Sardona, 2012).

▶ Sustainable use

Mostly Effective

The site is used for summer livestock grazing, hunting/fishing and some small agriculture. These uses are generally considered sustainable, although there is concern about excessive cattle grazing in some areas (UNEP-WCMC, 2011).

▶ Education and interpretation programs

Highly Effective

The site is combined with a Geopark with approximately 50 specific sites with associated interpretative materials or installations (UNESCO-Weltnaturerbe Sardona, 2012). It has an ambitious education strategy and an informative website in English and German (www.geopark.ch). As part of the implementation of the education strategy, a first group of GeoGuides was trained in 2011. There are also visitor centres, thematic tour offers,

brochures and flyers (e.g. Imper-Filli, 2010).
In 2012 two information centers were opened in the Canton of Glarus. Others are to follow in 2013-2015 in the Canton of St. Gallen and Graubünden.

► Tourism and interpretation

Highly Effective

Apart from the 50 sites of interest of the Sardona Geopark, visitor centres and GeoGuides, there are about 12 interpretative tour products on offer through the site's website. These range from 1 hour to several days in length. The site cooperates with local and cantonal tourism companies and networks, which provide complementary products such as accommodation, transport and gastronomy (UNESCO Weltnaturerbe Sardona, 2012).

► Monitoring

Mostly Effective

At the time of inscription, annual monitoring of biological, environmental, glaciological, and socio-economic indicators (e.g. visitation) was planned (UNEP-WCMC, 2011). An effective monitoring system has now been installed and some data have been collected already.

► Research

Highly Effective

The site has provided an immense contribution to the understanding of geology for the last 200 years. It triggered the development of overthrust theory, which in turn lead to the concepts of continental drift and finally plate tectonics, which gained acceptance in the 1960s. The site continues to give raise to a wide range of scientific publications, particularly on sedimentology, tectonics and quaternary geology. The site is also engaged in the management of the scientific knowledge accumulated from the site, though a central repository of scientific literature and information (UNEP-WCMC, 2011). Students from the universities of Bern and Zürich started working in the area in 2012 and will continue in the near future.

Overall assessment of protection and management

Highly Effective

The protection and management of the Swiss Tectonic Arena Sardona is overall effective to highly effective, in spite of a persistent funding gap in comparison to financial needs estimated at the time of inscription. There are, however, a number of ongoing management issues, including clarification of the implementation of the monitoring plans. Due to its inaccessibility and the appropriateness of its boundaries, the site is not subject to significant threats originating from outside its boundaries.

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

Highly Effective

Because of its inaccessibility and the appropriateness of its boundaries, the site is not subject to significant threats from the outside.

▶ Best practice examples

1. The site offers an example for an interesting cooperative management system which integrates national, regional and local authorities, as well as the tourism industry. This may be applicable to other comparable properties.
2. The education, interpretation and visitor programmes of the site are a best practice example of making a site’s values accessible to the general public, though a varied and well-documented range of activities, products and facilities

State and trend of values

Assessing the current state and trend of values

World Heritage values

► Exceptional example of mountain building tectonics

Good
Trend:Stable

The site's geological values are extremely robust in the face of anthropogenic impacts, are rather inaccessible in part and are well-managed (IUCN, 2008). As a result, the site's geological values are in a good and stable state.

Other important biodiversity values

► Forest, subalpine and alpine ecosystems with their associated flora and fauna

The site, which ranges from 570 to 3,257 m a.s.l. and occupies an area of 32,850 ha, comprises a wide range of subalpine and alpine ecosystems: Beech Fagus sylvatica and Beech-Silver Fir Abies alba forests up to 1,400 m, Silver Fir and Norway Spruce Picea abies forests with Swiss Mountain Pine Pinus mugo and Rhododendron spp. between 1,400 and 1,500-1,800 m, and stands of Arolla Pine Pinus cembra and thickets of Green Alder Alnus viridis around the treeline at about 2,000 m. Above the treeline, there are meadows of Rusty Sedge Carex ferruginea, mat-grass pastures of Nardus stricta, and blue moorgrass evergreen sedge swards of Sesleria caerunata and Carex sempervirens with a rich accompanying flora. There are also alpine mires, raised bogs, seepage communities, and alluvial riparian zones with rare plant communities. Among them is Plaun Segnas Sut at 2,100 m altitude, once of Switzerlands largest mire landscapes. There are also extensive rock and scree areas, as well as 16 small diminishing glaciers, 20 alpine lakes and seven peaks above 3,000 m a.s.l. The flora of the site includes about 800 vascular plant species, 50 of which are nationally protected. The fauna includes many typical alpine mammal species, 85 species of breeding birds, 5 fish species, 2 amphibian and 6 reptile species, and a diverse invertebrate fauna (UNEP-WCMC, 2011). The site hence comprises forest and particularly mountain ecosystems of national importance and is part of a WWF/IUCN Global Centre of Plant Diversity (WWF and IUCN, 1994), but does not overlap with a WWF priority global 200 ecoregion (WWF, 2012), an Endemic Bird Area (BirdLife International, 2012a), Important Bird Area (Birdlife International, 2012b), or CI Global Biodiversity Hotspot (Conservation International, 2012).

It has not been screened for Important Plant Areas yet (Plantlife International, 2012).

Summary of the Values

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

The site is an exceptional example of mountain building tectonics, including the Glarus Overthrust, as well as the exposures of the rocks below and above this feature which are visible in three dimensions. The site's geological values are in a good state and stable.

▶ **Assessment of the current state and trend of other important biodiversity values**
Data Deficient
Trend: Data Deficient

The nationally important biodiversity values of the site are inferred to be intact, although there is concern about impaired conservation state of alpine meadows due to overgrazing by cattle. However, no monitoring data on specific biodiversity values inside the site are currently available from the site's website (these are dispersed between local, cantonal and federal agencies), and the state of these values is therefore considered data deficient.

Additional information

Key conservation issues

▶ **Funding shortages**
Local

In comparison to the funding needs estimated at the nomination stage (UNEP-WCMC, 2011), there was a 44% funding gap in 2012 (Geschäftsstelle IG TAS,

2012). The cooperating entities of the site have already begun to intensify the search for sponsors among business and individuals.

▶ **Overgrazing by cattle**

Local

There have been reports of overgrazing in parts of the site (IUCN, 2008). The current extent and impact of overgrazing is unclear, and it might be useful to study this systematically as a basis for taking mitigating action.

Benefits

Understanding Benefits

▶ **Is the protected area valued for its nature conservation?**

The considerable nature conservation values are reflected by the ca. 30 national and cantonal as well as ca. 80 local protected areas on the territory of the site, although the site is not inscribed on the World heritage list for its biodiversity values.

▶ **Does management of the site provide jobs (e.g. for managers or rangers)?**

The number of jobs provided by the site is difficult to ascertain, because of its collaborative management structure, but likely to be in the order of tens to a hundred. In addition, a significant number of jobs (hundreds to thousands of jobs in tourism, which is the main economic activity around the site and particularly to the south) indirectly benefit from the attractiveness of the outstanding universal value, landscapes and biodiversity of the site.
Data deficient

▶ **Sacred natural sites or landscapes**

The landscapes of the high-mountain parts of site are of considerable wilderness value, which complements other values of the site.

▶ **Outdoor recreation and tourism**

Nature based tourism is practiced at a high intensity around the site (UNEP-WCMC, 2011).The site offers a unique opportunity to experience not only its outstanding universal valuel, but also the landscapes and culture of the Alps. This contributes significantly to income generation and the socio-economic development in the site's vicinity.

► **Importance for research, Contribution to education**

The site has critically contributed to humankind's understanding of geology, mountain formation and (indirectly) plate tectonics since the early 19th century, and continues to support extensive scientific research and publications (UNEP-WCMC, 2011). In addition, new know-how on the management of World Heritage and other natural areas is generated and tested by the institutions managing the site.

► **Contribution to education**

Based on the site's immense importance for geological knowledge generation and its exemplary visitor and educational facilities, it also functions as a living museum, which helps people understand how mountains and the geological environment in general have evolved throughout Earth's history.

► **Legal subsistence hunting of wild game, Collection of wild plants and mushrooms, Fishing areas and conservation of fish stocks, Traditional agriculture, Livestock grazing areas**

Parts of the site continue to be seasonally used as pastures and meadows and for agriculture, as well as hunting and fishing grounds, in a traditional way (UNEP-WCMC, 2011, Swiss Federal Office of the Environment, 2006). This provides livelihoods and income to a significant number of people (tens to hundreds), and maintains cultural landscapes within the site that have been formed as a result of traditional land use.

Summary of benefits

The main benefits of the Swiss Tectonic Arena Sardona are knowledge generation, education and nature based tourism, but the site also offers

significant nature conservation and natural resource use related benefits. There may be unexploited synergies between some of these benefits, such as between traditional natural resource use and nature conservation on the one hand and tourism on the other hand.

Projects

Compilation of active conservation projects

№	Organization/ individuals	Project duration	Brief description of Active Projects
1	Geopark Sardona		Training for GeoGuides, aimed at supporting education and interpretation activities at the site
2	Geopark Sardona		Establishment of a long-distance thematic hiking trail on the site
3	Geopark Sardona		Development of an integrated regional development concept based on nature based tourism

Compilation of potential site needs

№	Site need title	Brief description of potential site needs	Support needed for following years
1	Relevant academic institution jointly with local farmers and pastoralists	Study on carrying capacity of pasture areas inside the site for cattle grazing and participatory elaboration of sustainable grazing management plan.	

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