
WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

JUNGFRAU–ALETSCH–BIETSCHHORN (SWITZERLAND)

1. DOCUMENTATION

- i) **IUCN/WCMC Data Sheet:** (12 references)
- ii) **Additional Literature Consulted:** Chevallet, M.P. and K. Dullnig. 1991. *Les Espaces Protégés de L'Arc Alpin*. International Centre for Alpine Environments; Stone, P. 1992. **The State of The World's Mountains**. Zed Books; Reynolds K. ed. 1990. **The Mountains of Europe**. Oxford University Press; Price, M. 1995. **Mountain Research in Europe**. MAB Series, Vol. 14. Parthenon; Lieberman, M.. 1991. **The Alps**. Steward, Tabori and Chang; Esping, L.E. 1998. *Potential Natural World Heritage Sites in Europe*. Parks for Life Report; Hsu, K.J. 1995. **The Geology of Switzerland**. Princeton University Press; Messerli, B. & J. Ives. 1997. **Mountains of the World**. Parthenon; CIPRA. 1998. **Rapport sur l'état des Alpes**.
- iii) **Consultations:** Meetings with Canton of Valais JAB Committee including mayors of communes, tourism representatives, NGOs and Minister of the Valais Cantonal Government; and Canton of Bern JAB Committee including commune mayors, tourism representatives, NGOs and Minister of Bern Cantonal Government; President – Patrons Committee.
- iv) **Field Visit:** J. Thorsell and M. Price. March 2001

2. SUMMARY OF NATURAL VALUES

The Jungfrau-Aletsch-Bietschorn (JAB) region is located in the south central Swiss Alps midway between the cities of Brig and Interlaken. The site covers 54,000ha, 77% in the Canton of Valais and 23% in the Canton of Berne. Elevation ranges from 900m on the southern slopes to 4,274m on the summit of the Finsteraarhorn. Nine peaks in the site are higher than 4,000m.

The geology of the site derives from the "Helvetic nappe" (a large body of rock that was thrust over younger rock in Europe during the Miocene period). The folding and overthrusting of rock layers during the formation of the Alps, 20 – 40 million years ago, have produced very complex rock formations that have since been exposed by glacial activity. The summits of the Mönch and the Jungfrau, for example, consist of core crystalline rock that was overthrust on top of younger sedimentary limestone. In contrast, the Eiger, the peak located adjacent to the Jungfrau and the Mönch, is almost totally limestone. The physiography of the area is characterised by steep north-facing slopes and relatively gentle southern ones. The alpine crest acts as the watershed divide between the Rhine and Rhône rivers which respectively flow into the North Sea and the Mediterranean.

Classic examples of glacial phenomena occur in the site, such as U-shaped valleys, valley glaciers, cirques, horn peaks, and moraines. Of particular note is the Aletsch Glacier, the largest (128km²), the longest (23km) and deepest (900m) in Europe. The Fiesch glacier is the third largest and second in length in Europe. The retreat of both has been carefully measured since 1892. A related feature is the Trummelbach canyon and waterfall where glacial runoff has formed a spectacular gorge.

Climate is strongly influenced by the dominant winds and orientation of the ranges. On the Bernese side, the climate is sub-oceanic, with higher annual precipitation (1,420mm at Grindelwald). The Valais side is sub-continental with annual precipitation of 758mm at Brig.

Vegetation and fauna are representative of the Alps and vary by slope, aspect and elevation. There is a marked difference in vegetation between the northern and southern slopes. On the north side, forests at lower elevations consist of broad-leaved species such as beech, ash, alder, elm and birch. The south side is too dry for beech, which is replaced by Scots pine. On the northern side, the subalpine zone is dominated by Norway spruce with

mountain ash, silver birch, and stone pine and, on the southern side, by more continental species, such as European larch on young soils. An especially interesting area of stone pine forest is found adjacent to the snout of the Aletsch glacier, where plant succession from the receding glacier has been studied for over 100 years. Above the treeline are extensive areas of rhododendron scrub, alpine grassland, and tundra vegetation and, on the xeric southern slopes, steppe grassland.

Fauna in the JAB region is typical of the Alps, with a wide variety of species including ibex, lynx, and red deer (all reintroduced), roe deer, chamois and marmot as well as several reptiles and amphibians (e.g. the Alpine salamander). A representative range of Alpine birds also occur, including Golden Eagle, Kestrel, Chough, Ptarmigan, Black Grouse, Snow Finch, Wallcreeper, Lammergeier, Pygmy Owl and various woodpecker species.

The Bernese and Valais Alps have been an international centre for alpine tourism and mountaineering since the 18th century. In contrast to its surroundings, the nominated area is accessible by road and cable lifts only up to its perimeter. The exception is the Jungfrau railway which was completed in 1912 and brings over 600,000 visitors annually to a confined viewpoint 4km inside the northern boundary of the site. A very small proportion of these enter the site by ski or foot, often using one or more of the 23 alpine huts in the area. There are no permanent human residents in the site except for maintenance staff at the Atmospheric Research Station located near the terminus of the Jungfrau railway. Some seasonally-occupied farms exist along the southern perimeter and in the Stechelberg valley in the north-west border of the site. Small numbers of sheep and cattle graze these alpine pastures in summer. Over 95% of the area exists in a natural state with no facilities except foot/ski trails and mountaineering huts.

3. COMPARISONS WITH OTHER AREAS

There are 46 areas inscribed on the World Heritage List in the various mountain ranges of the world. These include Huascarán National Park (Peru) which is generally accepted to encompass the most outstanding group of peaks in the Andes, and Sagarmatha National Park (Nepal) which represents "the best" of the Himalayan range. Similarly, the most outstanding portions of many other mountain ranges have been given World Heritage status (for example there is one site each in the Caucasus, Altai, Urals, Pyrenées, New Zealand Alps, St Elias Mountains and the Pacific Coast range). Three natural World Heritage sites are found in the Rocky Mountains of North America, a region larger than Europe which extends over 40 degrees of latitude.

Within the Alps, a region spanning 1,100km and seven countries, no natural World Heritage site has yet been inscribed. The Network of Alpine Protected Areas identifies over 300 protected areas within the Alpine Arc. Most of these are small nature reserves and regional parks (IUCN category V), which may have cultural landscape values but would not appear as likely candidates under World Heritage natural criteria. In the 1997 UN List of Protected Areas (IUCN/WCMC), there are seven areas listed in the Alps under IUCN categories I and II. The JAB region stands out from all of these and other mountains in the High Alps in having the following four qualities:

- The scenic and aesthetic appeal of the JAB region is one of the most dramatic of the Alps, as evidenced by the long history of international visitation to the area. The impressive northern wall of the site with the panorama of the Eiger, Mönch and Jungfrau mountains provides a 25km long signature classic view of the north face of the High Alps. There are a number of other impressive peaks such as the Finsteraarhorn, Aletschhorn, Breithorn and Bietschorn, as well as the extensive views of the Aletsch glacier basin from the Eggishorn ridge. The only other areas in the Alps that rivals the JAB region for sheer scenic splendour are in the Pennine Alps around the Matterhorn/Monte Rosa and Mont Blanc. Both these areas have been much altered by human activity and are not under protective status. High natural scenic values exist throughout the Alps but are most dramatically expressed in the JAB region.
- Glaciation within the JAB region is the most extensive in the Alps. The Aletsch is the largest glacier in Europe in terms of area (128km²), length (23km), and depth (900m). For comparison, the longest glaciers on Mont-Blanc are less than 10km in length. The study of the Aletsch glacier began early in the 20th century and precise mass balance and runoff studies are on-going. Comparative studies on the fast-reacting small glaciers on the northern exposure have provided further indications of climatic change. Along with the extensive glacial cover of the area, an exceptionally wide suite of glacial features also occurs.
- The extensive glaciation and rugged topography found in the JAB region as well as protection measures which date back to 1933 have resulted in it being one of the most (if not the most) undisturbed natural areas

in the Alps. The intact status of such a relatively large area within a long-occupied and intensively-used economic region is another distinctive feature of the site.

- For its record of productive scientific research on geology, geomorphology, climatic change, biology and atmospheric physics, the JAB region is unsurpassed in the Alps and, in certain fields, at the global level. Observations on some of the glaciers go back to the 12th century and have allowed reconstructions of historical fluctuations, particularly of the highly sensitive glaciers on the northern slopes of the site. The scientific importance of the area is also indicated by the selection of the Grindelwald and Aletsch areas as two of four study sites in the Swiss Alps for MAB programme studies in the period 1977 – 1989. As noted in a review of Mountain Research in Europe (Price, 1995), this programme was most productive and generated a substantial quantity of data with practical planning applications. The research station at the Jungfraujoch is one of a network of global sites studying astronomy, high-altitude atmospheric phenomena, radiation and air quality. The Centre for Nature Protection at Riederalp also has facilitated natural history research in the region. While other areas in the Alps and Pyrenées have been important areas for research, scientific activity in the JAB region has been particularly impressive, with a particular emphasis on monitoring and understanding glaciological, geomorphological, and ecological processes (criteria i and ii).

Although the site has not been nominated for its biological values (criterion iv) it does contain a wide range of species typical of the Alps. However, floral diversity is higher in the calcareous massifs of the western and Southern Alps where Mediterranean affinities are stronger. It is important to note, however, that the nominated area is much more than just glaciers and rocks. Almost 20% of the area is in the forest zone and these lower altitudinal belts contribute to the overall natural features of the site.

Global comparisons are difficult and would be most relevant with other sites in temperate glaciated high mountain systems. The closest comparison would be with the Western Caucasus World Heritage site which, although much larger, contains peaks of lesser elevation (3,360m at the highest) and a much lesser extent of glaciation (18sq.km). A comparison of the JAB region with the Khumbu-Everest region in the Himalaya helps illustrate the uniqueness of this much smaller region of the High Alps. The relative altitudinal difference from the last village at the boundary of the JAB region (Stechelberg) to the top of the Jungfrau is 3,000m over a distance of 5km. In the Everest region, the elevation difference between the last village Dingboche (4,358m) to Ama Dablam (6,828m) is about 2,500m. Dingboche's relative relief with Mt. Everest is 4,500m but this is over a distance of 14km. The relative elevation differences and gradients in the JAB region thus are quite substantial even compared with the highest range on Earth. Similarly, the 23km length of the Aletsch glacier is longer than the ice streams flowing from the Everest/Lhotse massif with its 17km Khumbu glacier, 16km Rongpu glacier and 8km long Lhotse glacier. Another comparison can be made with the Canadian Rockies World Heritage site where the relative relief of Mt. Robson to its base, 6km distant, is also about 3,000m. While there are other longer glaciers in temperate mountain regions, e.g., Karakorum, Pamirs, Rocky Mountains, the Aletsch rates high even on a world scale.

4. INTEGRITY

Although portions of the site have been under conservation management since 1933, the JAB region, as now defined, is a collection of different designations combined to form a single contiguous unit. Much work has been undertaken to develop a management structure since the World Heritage nomination document was submitted in July, 2000. This work is on-going but as of the field inspection in March, the early concerns of IUCN on management issues have been addressed as follows:

4.1. Legal Status

The legal basis for the JAB region is a heterogeneous mix of designations from all three levels of government. The communes, which own most of the land in the site, have various contracts and ordinances that provide strong guidelines on construction of roads and buildings and modification to the landscape. The two Cantons also have various ordinances that apply to portions of the site. At the national level, the entire site falls within the Federal Inventory of Sites of National Importance which requires that the Cantons and Communes give special attention to any development within the area. Additionally, the conservation NGO ProNatura is responsible for two portions of the site under lease agreements with the communes.

The end result of these various overlapping legal mechanisms is that the site has a range of measures that have kept it as an intact natural area to date. Recognising, however, that the various designations are complex and

could benefit from a more coordinated approach, a process is now underway to prepare an integrated management plan. This will review the most effective options for protection legislation and suggest how the different jurisdictional responsibilities could best be harmonised. This process is expected to take 2-3 years and may also benefit from a review of protected area policy in Switzerland being conducted by the Swiss Academy of Natural Sciences. In the meantime, IUCN concludes that the existing legal basis is adequate to ensure that the site will not be affected by any activity inconsistent with its potential World Heritage status.

4.2. Management

Although the site is covered as part of regional plans by both Cantons, it does not have an integrated management plan but a working committee is now developing one. The committee has developed a "Mission Statement" that sets out principles and guidelines for the management of the site and which will be elaborated in the management plan. The preparation of the plan will take 2-3 years due to the intensive consultation process.

The current administrative structure which oversees and coordinates all the stakeholders in the area is given below (see Figure 1). This structure includes a Committee made up of representatives from NGOs, business, science, media, the tourism sector and regional planning authorities. All have contributed to the budget for current activities. There is also a "Network of Communes" committee which includes the presidents of all 14 communes.

4.3. Boundaries

The current delineation of the extent of the site was arrived at after intensive consultations, including formal voting procedures, with the 14 local communities and other stakeholders. While encompassing the main features of this portion of the high Alps, several adjoining areas of high associated natural values were not included. These occur along the northeast, eastern and western boundary as well as adjacent to Riederalp. IUCN is aware that discussions over possible extensions to the site are being held and that these will take some time to mature. IUCN concludes that the current boundaries adequately cover the highlights of the area. However, further discussions during the management planning process will likely lead to some refinements.

4.4. Other Threats

The JAB region is little impacted by human use inside its boundaries except for some declining grazing and forestry activity along the southwest and northwest margins. Adjacent to parts of the site are tourist developments that, if expanded, could affect its aesthetic values. The nomination notes that an official buffer zone is not feasible or necessary as much of the site is bordered by steep topography, glaciers, or seasonally-used pastoral landscapes. While these reasons are evident, IUCN would suggest that the "pressure points" associated with downhill skiing facilities near or adjacent to parts of the site should be given particular attention in the management plan.

At a global level, climate change is certainly affecting the site as evidenced in the steady retreat of glaciers over the past century. As in all glaciated areas, this will have inevitable effects on glacial volumes and scenic attractions. This should be recognised as an ongoing geomorphological process (criterion i) of which the site provides an outstanding example.

5. ADDITIONAL COMMENTS

5.1. The preparation of this nomination is a model case study in the "bottom-up" approach. Due to the structure of the Swiss system in which most responsibility over land use is in the hands of local authorities (communes), decision-making begins at that level and then proceeds up through the Cantonal and then Federal levels. Support for the nomination at the local level was first registered in community votes in favour of proceeding with the nomination, followed by approvals by the Cantons before reaching the Federal authorities. The major benefit of such an approach is that local support for the site is assured.

5.2. Throughout the Alps there is a strong historical and cultural presence. The JAB region, while predominantly natural, is surrounded by outstanding historical monuments and a harmonious cultural landscape. Indeed, where the site is not bordered by uninhabited precipitous topography, it abuts a landscape with a harmonious blend of pastoral uses, historical routes and small villages. The immediate regional land uses are carefully regulated and serve a *de facto* buffer function to the site.

5.3. The JAB region was one of two sites proposed as possible World Heritage natural nominations in the Alps at the June 2000 regional thematic expert meeting on potential natural sites in the Alps, held in Austria (the second being the Mont Blanc). This meeting noted the potential of cultural landscapes and generated a number of suggestions including the possibility of a serial site in the Alps. These discussions are evolving, but it is IUCN's view that the JAB nomination is clearly justified on its own merits as having the most outstanding combination of universally outstanding natural features in the region.

6. APPLICATION OF CRITERIA/STATEMENT OF SIGNIFICANCE

The JAB has been nominated under natural criteria (i), (ii) and (iii). The rationale for inscription of each is as follows:

Criterion (i): Earth's history and geological features

The JAB region provides an outstanding example of the formation of the High Alps which resulted from uplift and compression during the Tertiary geological period 20-40 million years ago. Within an altitude range from 900m to 4,274m, the region displays 400 million year old crystalline rocks thrust over the younger autochthonous (rocks formed *in situ*) calcareous sediments due to the northward drift of the African tectonic plate. Added to the dramatic record of the processes of mountain building is the great variety of geomorphic and glaciological features found in the site. Classic examples of U-shaped glacial valleys, cirques, horn peaks, valley glaciers and moraines are found in abundance. The JAB region is the most glaciated area in the Alps and incorporates the Aletsch glacier, the largest and longest in western Eurasia. It is thus of significant scientific interest in the context of glacial history and ongoing processes, particularly related to climate change. IUCN considers that the site meets criterion (i).

Criterion (ii): Ecological processes

Within its altitudinal range and its dry southern/wet northern exposures, the JAB region provides a wide range of alpine and sub-alpine habitats. On the two main substrates of crystalline and carbonate rocks, a variety of ecosystems have evolved in the absence of significant human intervention. Superb examples of ecological succession exist, including the distinctive upper and lower treeline of the Aletsch forest. The global phenomenon of climatic change is particularly well-illustrated in the region, as reflected in the varying rates of retreat of the different glaciers, in turn providing new substrates for ongoing ecological succession. IUCN considers that the site meets criterion (ii).

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

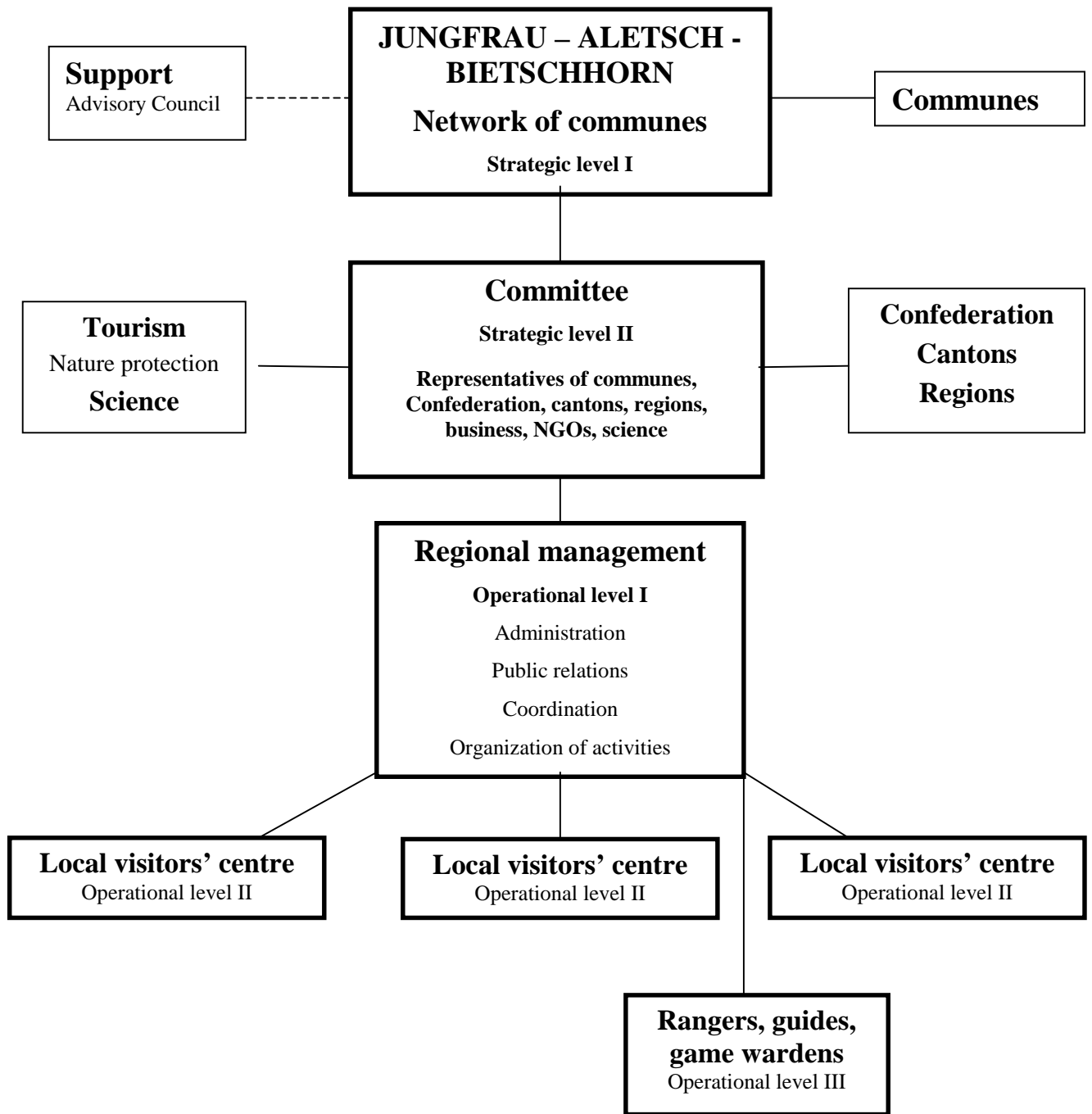
The impressive landscape of the JAB region has played an important role in European literature, art, mountaineering and alpine tourism. The aesthetics of the area have attracted an international clientele and it is globally recognised as one of the most spectacular mountain regions to visit. The impressive north wall of the High Alps, centred around the Eiger/Mönch/Jungfrau and extending 20km in length, is a superlative scenic feature. On the southern side of the alpine divide, tectonic forces and glacial erosion have resulted in a collection of spectacular peaks and a valley system which supports the two longest glaciers in western Eurasia. IUCN considers that the site meets criterion (iii).

7. RECOMMENDATION

The Bureau recommended to the Committee that the Jungfrau-Aletsch-Bietschorn be inscribed on the World Heritage List under natural criteria i, ii, and iii.

IUCN recommends that the Committee also encourage the Swiss authorities in their preparation of a management plan which, when completed, may also lead to modifications and extension to the boundaries. A mission to report on the status of the plan and to review any boundary changes should be undertaken in two years time.

FIGURE 1: STRUCTURE OF THE COMMUNITY OF INTEREST



From "Jungfrau - Aletsch - Bietschhorn UNESCO World Natural Heritage (candidate) Mission Statement (Draft, 07.06.01)" [The statement forms the basis and guidelines for the future management plan.]