

## Chapter 4: Environmental and sustainable development conditions specific to the various Olympic disciplines



### 4.7 Winter sports

#### 4.7.1 General

Winter sports are those which require water in solid form, be it ice or snow, to be practised. Some, such as Alpine skiing, bobsleigh, skeleton and luge, also require a slope.

*A distinction must be made between:*

- snow sports (skiing and biathlon), which can be practised in the naturally cold conditions of countries at higher latitudes and mountain regions;
- ice sports (skating, hockey and curling), which can be practised on natural ice surfaces but which, for competition, require indoor or outdoor artificial rinks;
- ice track sports (bobsleigh, skeleton and luge), which are practised using equipment to slide on the ice and require specially built tracks.

##### 4.7.1.1 Snow sports and cold ecosystems

Both competition and recreational snow sports are practised in the natural environment. In northern regions with very cold winters, they can be practised at low altitude, while in other regions they can be practised only at higher altitudes.

#### Northern ecosystems

The major ecosystems of the northern regions are the tundra, boreal coniferous and subboreal forests; these do not exist in the southern hemisphere.

- The tundra (Alaska, northern Canada, coast of Greenland and Iceland, northern Scandinavia and Russia) is characterised by very long winters and low precipitation. The ground is frozen all or part of the year. There is little diversity of flora with few trees, and there are few indigenous species among the fauna. It is a hostile ecosystem, but one which withstands quite well the presence of human activities, including snow sports, at all seasons.
- The boreal (taiga) and subboreal forests (Canada, Scandinavia and Siberia) are among the largest forest areas in the world. The boreal forests are chiefly coniferous, with a mixture of conifers and broad-leaved species in the subboreal forests. The latter are in decline, however, owing to atmospheric pollution and land clearing for agricultural and building purposes. During their short vegetation period (4 or 5 months), these ecosystems are environmentally rich in terms of fauna (from insects to mammals). They withstand the presence of human activities during the cold period, which is therefore suitable for snow sports.

We can see that the northern ecosystems are very suitable for snow sports during the cold season, provided that the facilities installed and the behaviour of the users respect the environmental integration criteria and the usual environment protection rules (treatment or recycling of waste water and rubbish, and lack of pollutants).

#### The mountain ecosystem

The mountain ecosystem is a complex one whose structure depends on its exposure to the sun, and which has a vertical succession of zones which, as one goes higher, have the characteristics of the major ecosystems around the world. The number of zones depends on the latitude of the mountain ecosystem.

For example, a mountain close to the equator will have:

- from sea level to 1,500m, the characteristics of the regions in the intertropical zone (equatorial and tropical forests);
- from 1,500 to 2,500m, the characteristics of steppes and deserts;

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- *from 2,500 to 3,000m*, the characteristics of the temperate regions of the world;
- *from 3,000 to 4,000m*, the characteristics of boreal and subboreal forests;
- *above 4,000m*, the characteristics of the tundra.

A mountain in a temperate region will have:

- *from sea level to 1,000m*, the characteristics of the temperate region where it is situated;
- *from 1,000 to 2,500m*, the characteristics of boreal and subboreal forests;
- *above 2,500m*, the characteristics of the tundra.

The boreal and subboreal forest zone of the mountain ecosystem is of particular importance, as it constitutes an ecological niche which is rich in flora and valuable for the fauna, but it also has a key function in protecting against avalanches and landslides.

This particularity of the mountain environment is what makes it so rich and attractive in terms of tourism, but is also the reason for its fragility. This environment is extremely sensitive to global warming, as changes of just a few degrees are sufficient to shift the level of the different zones. It is also very sensitive to human interference, as each of these ecosystems is relatively small, so their powers of self-regeneration are limited.



Figure 64: The mountain is a fragile ecosystem which is sensitive to climate change.

Mountain regions, which often suffer from difficult social and economic conditions, are therefore environmentally fragile, and human intervention must be carefully delimited and integrated. In particular, winter sports facilities should have the lowest possible impact on the physical and environmental characteristics of this environment (slope, length and insulating power of the snow cover, evacuation of water, protective function of the forest and lifecycle of the fauna). Some sports require heavy equipment for limited use. Priority should therefore be given to using existing or temporary facilities.



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Today, sports activities in mountain ecosystems need to be planned taking into account the change they are likely to face due to global warming. For this reason, the use of artificial snowmaking equipment is not a sustainable solution, but should rather be used chiefly to permit a gentle transition to an alternative use for mountain resorts which are likely to be affected by climate change.

### 4.7.2 Snow sports: skiing

#### 4.7.2.1 General

Olympic skiing is composed of six disciplines:

- cross-country skiing, alpine skiing, freestyle skiing and snowboarding, which are practised both in the natural environment and in stadiums;
- ski jumping, which is practised in artificial stadiums;
- nordic combined, which includes ski jumping and cross-country skiing events.

Cross-country skiing and the disciplines in stadiums are practised in snow-covered regions, at suitable altitudes and on terrain of suitable profile. For its part, alpine skiing requires steep slopes, and is therefore practised at an altitude where the ecosystem conditions are extreme, making it more sensitive to disruption of the physical conditions of the environment. Ski jumping is generally practised using an artificial structure which needs to be integrated into its surroundings in the best possible manner. Cross-country skiing, nordic combined and ski jumping have been Olympic disciplines since the first Winter Games in 1924 in Chamonix. Alpine skiing joined the Olympic programme at the 1936 Winter Games in Garmisch-Partenkirchen. Freestyle skiing became an Olympic discipline at the 1992 Games in Albertville, and was joined by snowboarding in 1998 at the Games in Nagano.



Figure 65: Skiing is practised in parts of ecosystems similar to the tundra and boreal forest.

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### Some facts

- There are more than 12,000 skilifts and cable cars in the European Alpine area.
- In mountain areas, avalanches are a deadly natural risk. They are the result of weather, snow type, temperature and landscape, but they are also caused by people skiing in avalanche zones and disregarding official warnings.
- One of the main environmental problems caused by winter tourism is the road traffic. Around 80% of skiers continue to travel by car.
- In certain conditions, snow-generating machines can supplement insufficient snow cover. For competitions they provide the same snow conditions for all competitors. However, the machines need large quantities of water and energy (around 2,000m<sup>3</sup> of water and 15,000 - 20,000 kWh per hectare of ski run per season).

### 4.7.2.2 An environment-friendly approach to skiing

The snow in the mountains determines the cycle of vegetation and animal life, and also has a thermal and mechanical protection role enabling the various elements of the ecosystem to survive in spite of the adverse climate conditions. Any change in the type of snow can therefore have an effect on both these functions.

- New ski runs in forests increase the amount of direct sun to the forest edges, which can cause localised damage to the bark;
- Off-piste skiing in woods can hinder their regeneration, because the ski edges cut the small trees buried in the snow;
- Off-piste skiing in woods can be a cause of major stress for the fauna which, hindered by the snow cover, cannot run away from skiers;
- When there is little snow cover and in extreme situations (ridges or steep slopes), the edges of skis, and particularly snowboards, cause mechanical damage to the subsoil;
- Snow-generating machines change the structure of the snow: packing it can lead to the formation of ice, a deterioration of its thermal insulation, freezing of the ground and a lack of oxygen, which encourages the growth of mould;
- For the wild mountain fauna, the end of the winter season is the time of reproduction and feeding to compensate for the winter period. Off-piste skiing can seriously hinder these activities which are essential for the survival of the animals.

### Rules of conduct for preserving the environment for skiing

- Gather information about different ski areas, and give preference to resorts which take care of the environment;
- Wherever possible, use public transport to travel to the mountains. In the resort, move around on foot or take a bus to the skilifts;
- When using a private car, try to travel in groups avoiding empty seats;
- Avoid using helicopters, snow scooters or any means of transport other than the public skilifts, skins or walking to get to the top of the runs;
- Be aware of snow conditions and adapt your skiing programme to them. Ask advice from the people in charge of the resort or the local inhabitants;
- Find out where the high-risk and environmentally important zones are and respect these strictly;
- Ski only on marked runs and in authorised off piste areas;
- Consider, when possible, the use of products that conform to environmental and sustainable development criteria;
- Maintain the heating where you are staying at a reasonable level and avoid wasting water;



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- Be respectful towards the local population, their way of living and customs. Take advantage of their knowledge to learn about the local environment;
- Do not leave behind any rubbish on ski runs;
- Collect and sort your rubbish for collection and recycling by the local services.

### 4.7.2.3 The impact of skiing events and the facilities needed for these

Depending on the type of event, attention needs to be paid to the various types of possible impact. For cross-country skiing, the presence of the public on a large area of the natural landscape will be a central element to consider. For Alpine skiing, it will be the route and maintenance of the runs and skilifts, while, for ski jumping, the focus will be on the construction aspects of the jumping hill and landing area.

### Environmental protection for skiing events

#### Organisers' responsibility

- Plan events taking into account both environmental and sustainability issues in coordination with the sporting, cultural, economic and social interests;
- Put in place an environmental management system;
- Respect the legal rules on protecting the environment;
- Develop and build using ecological technology;
- In case of irreversible environmental impacts, plan compensation measures;
- Do not site any facilities in areas of particular environmental importance, and especially not in national parks;
- Inform and seek the acceptance of the local population;
- Seek cooperation with governmental authorities and NGOs to benefit from their expert knowledge;
- Restrict individual traffic in favour of public transport;
- Save energy. Use the appropriate technology and renewable energy sources;
- Make sparing use salt and dyes for hardening and marking the snow;
- Keep the demand for water within the limit of the natural supply in the region and prevent any strain on the habitual use by the population;
- Avoid overloading the existing waste treatment systems;
- Minimise the amount of solid waste caused by the event. Oblige all parties present to collect and separate waste;
- Channel spectators along the cross-country or Alpine skiing run with clearly indicated routes which avoid dangerous or environmentally sensitive areas;
- Inform the public of the rules of conduct concerning safety, respect for the environment and waste management;
- Provide rubbish collection points all along the ski run;
- Raise media awareness of the need to: avoid damaging the ecosystem for their reporting needs, avoid creating pollution and leave nothing behind after the event.

#### Competitors' responsibility

- Set an example in terms of fair play and respect for the environment.

#### Advertisers' responsibility

- For the promotional objects distributed to the public, minimise packaging, avoid plastic packaging, and clearly indicate on the object or its packaging what to do to avoid causing pollution with the object and its packaging.

#### Spectators' responsibility

- Wherever possible, use public transport to get to and from the competition venue;

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- Do not take anything from the natural environment;
- When moving around the venue, keep to the paths provided by the organisers;
- Do not leave behind any packaging, rubbish or leftover food.

### 4.7.2.4 Special waste, toxic products and pollutants linked to skiing

In addition to snow-generating machines, the mineral salts (often agricultural fertilisers) used to harden the snow are another controversial issue. Mineral salts lower the melting point of the snow, which then freezes more easily and hardens the ski run for a short time. This technique must be used only to prepare competition runs. If used excessively, mineral salts increase the salinity of the ground and the subsurface water, leading to changes in the type of vegetation.

Skis are now made of a synthetic resin and carbon core, metal edges and metal and synthetic resin bindings. Skis which are no longer used should be treated according to the best practices: the metal parts must be recycled and the core must be destroyed, or reused, by a specialist company.

### 4.7.2.5 Other aspects of skiing linked to sustainable development



Figure 66: Skiing is a sport which enables people with disabilities to enjoy the special relationship between man and nature.

Skiing is a sport which involves a close relationship between people and the environment. It requires an intimate relationship with the natural elements of this environment, such as snow and forest. In this sense, it is an excellent way of learning about nature and learning to respect it.

Skiing, like other altitude sports (hiking and climbing), also represents an opportunity for naturally resource-poor regions. This should therefore be exploited, whilst respecting the environmental conditions which ensure the sustainability of the ecosystem, but also the living conditions needed for the people who live in the mountains.

