

Handbook of good practice in ski mountaineering races

Authors : F.Javier Gómez (ESP), Natàlia Rovira (And)

Reviewers: Jaume Esteve (AND), Lluís Marsà(AND), Sepp Rottmoser (GER) i Bertrand Golts (SUI)

(November 2017)

Contents

Presentation	1
1. Introduction	1
1.1. Environmental awareness in the world of sport	1
1.2. Environmental policy in ski mountaineering competitions	4
1.3. Guidelines to achieve a sustainable sporting event	5
2. Beginning: environmental diagnosis of the event	7
2.1. Subject areas	8
2.2. Environmental Vectors	9
2.2.1. Biodiversity	10
2.2.2. Waste	11
[Table 1: basic scheme of selective waste collection]	
2.2.3. Mobility	13
2.2.4. Buying Green	14
2.2.5. Water and Energy	15
2.3. Assessment of impacts	15
[Table 2: Description of environmental impacts of a race and monitoring indicators]	
3. Taking action: good practice for a more sustainable race	18
3.1. Course	19
[Table 3: good practice on the course]	
3.2. Catering	21
[Table 4: good practice in catering and refreshment stations]	
3.3. Areas	22
[Table 5: good practice in sustainable management of areas]	
3.4. Communication	23
[Table 6: good practice in communication management]	
3.5. Mobility	23
[Table 7: good practice in mobility]	
4. Social responsibility	24
4.1. Environmental Information and communication	24
4.2. Contribution to projects	25
4.3. Compensation of CO ₂ emissions	26

Presentation

This document aims to provide criteria and methodological tools to improve the sustainability of ski mountaineering races and their compatibility with the conservation of the natural spaces where they are developed.

In this sense, issues that can be of special use for *race organizers* are included, in order to serve as a conceptual basis for the realization of sustainability reports, as well as a compendium of good practice and actions aimed at improving the same as understood in a broader sense.

However, the document also includes many other issues for the rest of the groups that make up such a sporting event. Thus, resources are also provided that can be useful to:

- improve the sports experience of *athletes*,
- facilitate the environmental monitoring of these events by the *authorities*,
- help improve the impact of these events on the sustainable development of local communities in the mountain areas where they are developed,
- And help raise the awareness of the *whole society* (fans of ski mountaineering or other outdoor sports) on the need to improve the sustainability and conservation of mountain areas.

1. Introduction

1.1. Environmental awareness in the world of sport

At present, more and more people are practicing sports in direct contact with nature, a fact that is evident in recent studies such as the Global Report on Adventure Tourism published by the World Tourism Organization (WTO) and the Adventure Travel Trade Association (ATTA). These outdoor activities have not only experienced quantitative growth in terms of number of athletes, sporting events or followers of these, but have also diversified in a very remarkable way in terms of the natural spaces where they take place (mainly in the mountains, but also in aquatic areas, etc.) and in terms of the time of year (winter sports, summer sports).

Although this boom in sports and sporting events in nature has had positive results in people's quality of life (health, etc.) and at the same time they represent a sector of economic activity that is truly remarkable, it is also true that they have given rise to a very significant increase in the negative environmental impacts associated with this greater presence of people in natural environments, especially the undesirable effects on the state of conservation of the natural spaces where they are developed: physical alteration of the environment, waste, chemical contamination, etc. Impacts that tend to worsen when many people, both athletes and followers, are concentrated in the same space and at the same time, as is the case with major sporting events.

In practice, the manifestation of these environmental impacts associated with the practice of outdoor sports is a particular fact that highlights the existence of a problem of much larger dimensions and which refers to the limitations that the planet has experienced to assimilate those derived from contemporary human activities.

The reflection on these ecological approaches began to be more present in society as of the 1980s, when it became apparent that the current way in which we relate to nature cannot be maintained much longer due to the depletion of non-renewable resources, the loss of environmental quality and other environmental problems derived from the activities of an increasingly larger population that seeks to meet their needs. There was a new way of doing things to ensure that these "*limits of growth*" and environmental problems were resolved, and this was the one posed by the concept of "*sustainable development*" and later "*sustainability*", expressing that the way forward was "*to satisfy the needs of the current population without compromising the resources and possibilities of future generations*".

In recent years, this same reflection on the environmental limits associated with the practice of sports in the natural environment has been very present in various sectors of society, among which one of the most active has been, without a doubt, that of the athletes themselves. Thus, one of the first voices about the existence of problems in natural environments due to sporting activity arose from one of the groups with more sensitivity to nature, that of mountain climbers. In this way, during the 44th General Assembly of the UIAA (International Climbing and Mountaineering Federation) carried out in the capital of Nepal in 1982, and with the participation of one hundred and thirty-five delegates from twenty countries to exchange ideas and experiences on various problems related to mountain activities, the Kathmandu Declaration of Mountain Activities was approved, the first worldwide reference document which makes mention of the fragility of these ecosystems and the need to become aware of the environmental impacts of hyper frequency. Other milestones in this way towards sustainability in the mountain are the "*Mountain Ethics Declaration*" (2001) also by the UIAA, which included the general principles of mountaineering, among which respect for the environment, or the "*Declaration of the Tyrol*", a text approved in Innsbruck as one of the central activities of what was the International Year of Mountains in 2002. This declaration includes a series of principles based on traditional non-written values as well as codes of conduct inherent in sport, which include a respect for the environment. Specifically, it is committed to "maintaining nature intact", an ethical reference in the line of the philosophy of "Leave no trace".

From the world of Olympism, voices that opt for a rational and respectful outdoor sports practice have also been reiterated. In this regard, the International Olympic Committee through its Committee on Sport and the Environment has been working together for decades with the United Nations Environment Program (UNEP). As a result of this collaboration, important milestones such as the "Manual on sports and the environment" (1997), the first text that related to the analysis and improvement of the relationship between sports practice outdoors and the sustainability and importance of a clean environment, sustainable development and an active attitude to conserve it, especially in the framework of major events such as the Olympic Games; as well as the document "Agenda 21 of the Olympic Movement"¹, approved during the third World Conference on sport and the environment held in Rio de Janeiro in 1999 (precisely the city where in 1992 the Summit of the Earth was held and where this concept of Agenda 21 was launched to the world), or the most recent "Sustainability

through sport: implementing the Olympic Movement's Agenda 21" ² (2012). In synthesis, the commitment of the Olympic movement for sustainability is based on:

- Recognizing on the one hand the need for athletes (people) to have a healthy environment for sports (clean air, water and quality food, and green spaces).
¹ <https://stillmed.olympic.org/media/Document%20Library/OlympicOrg/Documents/Olympism-in-Action/Environment/Olympic-Movement-s-Agenda-21.pdf>
² https://stillmed.olympic.org/Documents/Commissions_PDFfiles/SportAndEnvironment/Sustainability_Throug_Sport.pdf
- Recognizing the importance of sport and the Olympic movement as a group in the overall objective of ensuring social sustainability (promoting health and good habits, fighting against exclusion, etc.) specifically at the environmental level. To carry out this part, all actions of the Olympic movement must respect the environment and sustainable development, take care to preserve the landscape, natural resources and cultural heritage, while at the same time reducing the environmental impact of events and sports facilities (reduction of energy and water consumption, minimizing pollution, protecting biodiversity and reducing and managing waste properly)

1.2. Environmental policy in ski mountaineering competitions

In general, ski mountaineering is not a sport with a significant environmental impact, both due to its characteristics and the profile and character of the clear majority of its practitioners, as people who love and enjoy contact with the mountain and align with the ethics of the outdoors, respect for the environment and keeping nature intact.

Even so, for many years now, the International Ski Mountaineering Federation (ISMF), the world governing body of competitions ³, as well as the National Federations, have been aware of current environmental problems and there is a desire to take an active part in their solution. For this reason, the ISMF created in 2013 a Committee for the Environment to work independently with the objective of protecting the natural environment where sports events of ISMF are developed and to help the organizers of sporting events to participate in a systematic approach that ensures sustainability.

In this sense, the ISMF has stipulated an environmental policy that is obligatory on the part of the Local Organizers of the competitions (called LOC) if they want them to be validated and incorporated into the official calendar. These criteria follow the line of the sustainability recommendations proposed by the "Agenda 21" of the International Olympic Committee in (1999) and integrate generic aspects related to polluting emissions into the atmosphere, water or soil, the production and management of waste, the use of natural resources and raw materials (water, electricity, fuels, etc.), local disturbances (noise, smells, visual impact, etc.), the effects on biodiversity or environmental risks.

In practice, however, the competence to ensure the sustainability of the races and follow this environmental policy belongs to the organizers of the same, the LOCs. In addition to deploying actions and measures to ensure compliance with these requirements, they also have the responsibility to:

- Appoint a person in charge of sustainability who will be in contact with the corresponding representative of the ISMF. This is the Environmental Protection Officer (See ISMF Rules for organizing International ski mountaineering competitions paragraph 4.1.3).
- Write and sign an environmental policy statement with a commitment to respect the local regulations where the event takes place and to prevent the impact that may occur.

- Write a report of environmental analysis and an environmental program that determines and develops in each case the necessary actions to comply with the established environmental criteria.

The events supervised by the ISMF are the World Cup (which is an annual event with a set number of locations), the World Championships, the Continental Championships organized in Europe, North America and Asia and the ISMF Series

1.3. Guidelines to achieve a sustainable sporting event

When considering what an event should consider in order to be more sustainable, a series of basic principles arise which should be safeguarded, such as:

- *Self-sufficiency*; it implies the fact that the organization should be able to assume the greatest possible part of the management of the environmental derivatives caused by the event.
- *Prevention*; it implies that work should be done as far as possible to avoid disturbance or socio-environmental impact before they occur.
- *Eco-responsibility*; it implies that those responsible for the event must meet the environmental cost of using the territory and generating environmental impacts.
- *Proximity*; it implies that as much as possible, resources and services need to come from or be managed in the immediate environment so that at the same time, they may contribute positively to the sustainability of the local environment and to prevent potential environmental impacts from transcending to third parties.
- *Shared responsibility*; it implies that sustainability must be assumed by all the participants that integrate it and that there is a need for joint and co-responsible work to achieve the objectives set.

To the extent and scope in which these principles are applied, we can speak of different levels of improvement of sustainability.

Thus, in a first level of realization of sustainability we find measures aimed at avoiding the direct impacts of sports practice and the "footprints" that it leaves in the environment (the philosophy of "Leave no trace"), in practice a very basic but profoundly necessary vision.

However, a sporting event transcends by its quantitative and qualitative characteristics the simple individual practice of a sport, so it is necessary to go a step further in considering the way in which sustainability and respect for the environment are defined.

In this sense, any sporting event that wants to be sustainable should in addition to not leaving any trace, be in the storyline of the beforementioned sustainability definition and ensure that it "meets the needs of all the members of a race without compromising the natural environment, with a view to continuing the activity in the future".

This should mean, in addition to the fact that it does not generate a significant impact on the state of conservation of the environment in which it is developed, **reducing the "ecological footprint"** of the event as much as possible, in other words, its global impact. Given that the

zero impact is virtually impossible to achieve, in order to reduce this ecological footprint, it is essential to minimize the negative consequences associated both with the consumption of goods and energy that the event needs in order to be held, as well as the derivatives it causes.

In practice, taking care of this second level of involvement and carrying out a more sustainable ski mountaineering race as a whole should involve *4 basic strategies*:

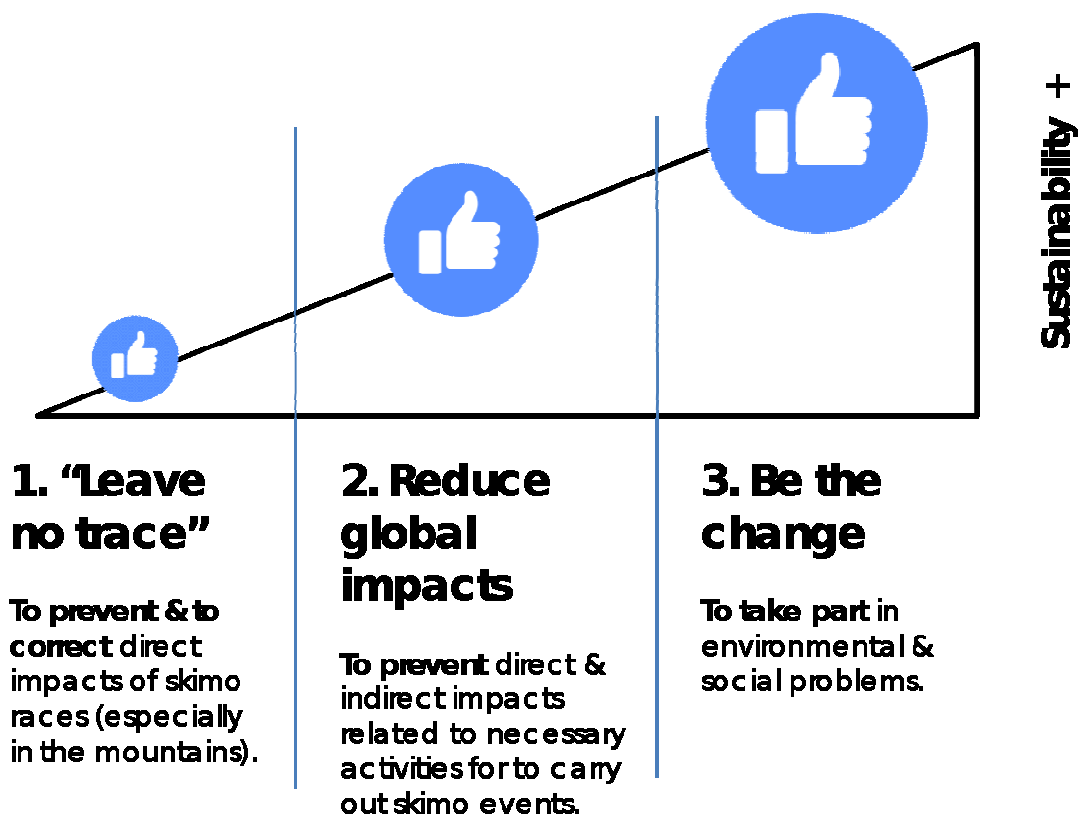
<p>1. Avoid traveling through ecologically sensitive areas or areas involving significant impacts on biodiversity.</p>	<p>2. Prevent as much as possible the generation of negative environmental derivatives (waste, sewage, emissions, etc.) as well as ensure the proper management of the same.</p>
<p>3. Minimize the consumption of resources and energy to responsible thresholds avoiding waste always and prioritizing solutions committed to efficiency. In addition, more efficient consumption means saving money.</p>	<p>4. Opting for greener products and services, from renewable and / or responsible resources (recycled or local materials, Eco certified, without pollutants or toxic to health and the environment) as well as renewable and clean energies.</p>

At this point we could think that we have achieved a large part of the goal of setting up a more sustainable ski mountaineering race and in practice it is a correct approach, since, thanks to the desire not to leave a mark and to reduce the ecological footprint of our event we have contributed to minimizing its environmental impact. However, despite this, we live today at a time when global environmental challenges are so important that they require the involvement of the whole society to tackle them. For this reason, it is important to **consider and recognize the responsibility of the world of sport and its transforming capacity** when it comes to contributing to these issues of global scope and not only to consider the reduction of the negative environmental impacts that could be derived from the "simple" sporting practice.

This global responsibility movement has as its closest reference the United Nations Program of Sustainable Development Goals (SDGs), a set of 17 landmarks related to the future international development that integrate aspects ranging from poverty, hunger, peace, health, education, inequalities, inclusion, economic prosperity, the protection of the planet, the fight against climate change, cities and territories, energy or sustainable consumption and production. These SDGs included in the so-called 2030 Agenda are the result of a collective process that began after the Rio + 20 Summit involving 193 states and the unprecedented participation of civil society, entities, business fabric, etc.

A very significant case, for example, is how, the world of sport can contribute to SDG number 13 action for the climate and the fight against climate change, a phenomenon that is especially relevant both for its global effects on health and nature, as well as the impact this phenomenon will have on mountain areas and on the activities, that take place, such as snow sports.

In practice, the first time that from the international associations linked to the mountain, attention was paid to the effects of climate change was during the General Assembly of the UIAA in 2006. In that year, in Banff (Canada), a first resolution was signed that recalled that the effects of climate change are especially visible on glaciers and mountain regions and recognized the important role played by mountaineers in this aspect to reduce the impact of their activities as well as in the task of sensitizing society in general to raise awareness about its effects. More than 10 years later, the reality of the impacts associated with climate change has become much more evident in mountainous areas of the planet, with very significant changes in the rainfall or the stability, coverage and durability of snow cover. In this regard, in 2015, the UIAA adopted a new statement which expressed clear and emphatic concerns about the negative effects of climate change on all the earth's resources in general and in mountain areas and communities particularly and showed their support to achieve the goal of a global climate agreement at the COP21 in Paris which would legally bind the reduction of greenhouse gas emissions to limit the increase of the average temperature of the planet to 2°C. In this regard, having the will to integrate these major aspects in planning a sporting event (climate change is just one example, but you can also consider the fight against poverty or responsible production and consumption) and considering contributions is a way to further improve sustainability by taking an active part and being examples of the necessary changes required by the whole society and the planet.



2. *Beginning:* environmental diagnosis of the event.

The starting point to improve the sustainability of a ski mountaineering race is to know and analyse which environmental derivatives you have and do it in a systematic and accurate way, at the same time with a broad vision of what an event of this kind involves.

The ISMF identifies this phase with the accomplishment of a "Report of Environmental Analysis", a document that should serve to determine and characterize all aspects that may be related to the sustainability of each race, even those that, despite not having direct control on their management have influence, and mark improvement objectives. According to ISMF regulations, it is mandatory for each LOC to have this document, as well as update it if there are substantial changes in the development of the competitions.

In general, the environmental analysis report should be able to include:

- *basic information about each race* (date, time, place of execution, number of participants, etc.),
- *information on the physical territory* on which it is developed (ski runs, infrastructure used, etc.),
- information on the *activities* carried out by each LOC during the event (catering, press, etc.).
- characterization and evaluation of the environmental effects arising from the actions of the event.

A very interesting way to carry out an analysis is to implement a methodology called environmental or eco-auditory diagnosis, an analytical tool that serves as a systematic radiograph of how the environment is affected or how a certain activity is sustainable. These methodologies have their origin in the world of industries, and were designed with the objective of environmental improvement of companies. However, the eco-auditory procedures have been widely used in many other activities for their usefulness in systematizing not only the possible environmental impacts associated with them, but also the characterization of them and the needs for improvement that they derive from them.

The basic procedure of an environmental diagnosis is based on the approach of confronting the activities that are part of or take place within an event, called subject areas, with the environmental aspects on which they may have a direct or indirect influence, called environmental vectors. From here we obtain a matrix where the impacts and interactions identified are systematized, in which it is important that they are completed as much as possible with quantitative information to evaluate their significance towards the sustainability of the event.

2.1. Subject areas

These are the different areas or scenarios in which the logistics and organization of an event can be divided and where the set of actions and activities that will make up the entire sporting event will take place and will be developed. These subject areas transcend the simple physical and specific space of a ski mountaineering race, as they integrate the complementary areas that are necessary in an event of this type, such as caterers, briefings and press conferences, accommodation of participants, etc.

Thus, a possible system to be applied when it comes to plotting the subject areas in which you can split a ski mountaineering race would be:

- **Course.** It refers to the circuit where the athletes will pass, and includes all the logistics operations and interventions related to the definition, marking and adaptation of the space enabled for the race, both in the days before as during and when the competition finishes. Includes aspects related to safety and avalanche protection.
- **Catering.** A section that summarizes all activities that involve food distribution, during the races such as group meals for participants.

- **Areas.** Elements related to the management of input and output flows of energy and materials in the different areas that integrate the day to day of the race (press room, catering areas, meeting rooms, etc.). Section of special interest for waste management.
- **Communication.** Actions related to the production of materials and communication services about the event (posters, press, competition dossiers, merchandising, etc.).
- **Mobility.** It includes all the journeys and transportation of persons and materials associated with the race.

Safety and avalanche protection

In some cases, it is necessary to use explosives to eliminate avalanche risk. These interventions have a high impact on fauna and, depending on their intensity, they can generate structural problems in the habitats where they are detonated. However, the snow cover especially when it is thick cushions and absorbs the impact, avoiding significant structural damage. The use of explosives can also lead to uncontrolled dumping of waste into the environment. In general, the main explosive systems that are used are:

a) Explosive substances. Their generic characteristic is that they practically do not leave residue since the deflagration of the wraps (papers and plastics) are usually self-consuming. At the level of explosive substances, we can distinguish:

Explosive cartridges. GOMA2, ECO GOMA2 OR GEL (emulsified nitroglycerin). With worm detonation systems, they can leave burnt powder residue on the snow that has a low impact (it is a carbon base), with a NONEL detonation system, it is necessary to remove the residue from the plastic cord that can have a variable length (between 50 and 100 m, usually).

CATEX and GASEX. In the case of catex the explosive charge is carried by an existing cable car and is usually detonated at the same point, keeping the impact local. The Gasex expel propane and oxygen under pressure that, when switched on, generate an expansive wave which is more dispersed than a precise detonation that moves the snow. Despite not leaving a residue, a fixed infrastructure is required to carry the gas.

Barrel or arrow shot. Explosive load that is shot to the point of detonation. Arrow tails remain as physical residue.

b) *Pyrotechnics*. Mechanisms like the Odin system, which generate an expansive wave. When detonating they normally leave the residue of the shells (plastic, paper)

2.2. Environmental vectors

It is very important that an environmental diagnosis has a thorough and accurate monitoring of the different issues related to the environment and sustainability that may be affected by the event of the race and its complementary activities, such as polluting emissions in the atmosphere, water or soil, the production and management of waste, the use of natural resources and raw materials (water, electricity, fuels, etc.), local disturbance (noise, smells, visual impact, etc.), the effects on biodiversity or environmental risks.

To facilitate the inclusion of all these factors into a system, it is interesting to group them into large categories, the so-called environmental vectors. Of environmental vectors a good number can be distinguished, but in the specific case of those that could be susceptible to being affected by the activities of a ski mountaineering race, one could highlight *biodiversity, waste, mobility, responsible consumption (green buying), energy and water*.

2.2.1. Biodiversity

Ski mountaineering races have as a scenario winter location and normally all ISMF races have a start and finish area near a ski resort. According to race modes⁴, it is usually normal that the courses of the vertical race competition occur on ski slopes; sprint races and relay are usually carried out in areas close to the slopes, and individual and team races are those that have a greater development in off-site areas.

In any case, whether it be areas which have been more transformed and intervened (infrastructures related to the ski resorts) or without a normal presence of human activity, these are natural areas of high altitude characterized by a series of factors that, in general, affect a certain ecological fragility:

- Presence of singular habitats with a strict physical-chemical balance and sensitive to alterations in their morphology, such as wetlands and peatlands.
- Presence of unique species of fauna and flora (such as mountain cockerels, large birds of prey and other birds of rock habitats, etc.)

In this sense, one must be aware that the passage of a large number of people concentrated in time and space in mountain areas as well as the logistics necessary to develop an event of these characteristics (basically traffic of vehicles such as snowmobiles, rattrack machines, helicopters) can cause disturbances both in terms of natural habitats and to living beings:

- Morphological alteration of sensitive natural spaces. In practice, it is mitigated and considered negligible if the protective mantle has sufficient thickness to cushion the effect of intense and continuous passage.
- Disturbance to fauna related to the loss of environmental tranquillity in their vital spaces (noise, human presence, etc.) that can cause stress. This impact is generally negligible, since the fauna usually flees and returns once the disturbance has passed; but it can be especially significant if these disturbances occur at sensitive moments in the life cycle of animals, such as
- Breeding and reproduction period, causing stress levels that affect these processes and may even lead to the death of animals.
- With regards to species of flora, the presence of a sufficiently large and widespread snow cover causes the impact on them to be practically negligible

Thus, to know what the environmental impact at biodiversity level in an event of this type may be, it is essential to describe both the natural habitats through which the race passes and to know what main populations of fauna of interest may be affected by the path of the course and to include reference maps.

⁴ The sporting events of the ISMF include five disciplines:

- *Individual race*; it is a race with at least 3 ascents and descents and an element on foot with skis on the backpack – depending on the actual route and snow conditions, crampons, harness, cord and maybe even a pickaxe may be required.
- *Team race*; it is a race with the same equipment as per the Individual race. Teams are made up of two members, who must stay together throughout the race. This is the longest event, usually about 1 hour 45 minutes for the fastest men. The team event has very steep climbs – 4 to 5 in general – which necessitate carrying the skis, wearing crampons and being roped up in some gullies.
- *Vertical race*; it consists of climbing as quickly as possible approximately 600 m of vertical ascent. Manipulation does not help only speed and perfect technique and endurance count. Right up the groomed, steep slope, less than 20 to 30 minutes for the best to reach the top (depending on the gradient). This intense and violent effort for the heart and muscles requires exceptional speed and technique
- *Sprint race*; it combines most of the elements of a classic ski mountaineering race, uphill on skis and skins, a section on foot with skis on the backpack, and a descent, with the last part often using 'skating technique' on flat or slightly uphill, to cross the finish line. However, the distance covered is short and the whole route from start to finish should not last more than 3 minutes.
- *Relay*; it requires the same effort of the Sprint – short and dynamic. There are 4 runners in each men's Senior relay team, 3 competitors in the youth (Junior / Cadet) and Senior women's teams. Each skier travels approximately 160 m in vertical ascent (x2) and descent (x2), as well as a passage on foot. Here the battle is also extreme energetic.

2.2.2. Waste

The daily activity of people generates, to a greater or lesser extent, a series of waste, materials discarded due to their lack of utility, an issue that is aggravated both quantitatively and qualitatively when there is an accumulation of people as is the case with a sporting event.

The proper management of waste generated in ski mountaineering races caused by the organization, participants and spectators is a challenge due, in particular, to the constraints imposed by the environment in terms of services (fewer facilities than in urban areas or non-existent, etc.) and with regards to ecological context (fragility of the mountain spaces).

In order to deal with the proper management of waste in events of this nature it is important to apply the current approaches in the matter that are based on a hierarchy of management methods ranging from processes that are socio-ambientally more appropriate and, therefore, preferable, which should be priority and the most important in the management of waste, to processes that, although necessary to deal with this problem, should be considered as last options or final alternatives given their worst environmental aptitude. In essence, the three processes to take into account in the management of the waste derived from the races should be in the line of the so-called "3 R", reduce, reuse and if not possible, recycle as a last resort.

- **Reduction.** Waste management processes that minimize production at source. In essence it is the preferred option since it avoids from the source the consumption and production of waste and therefore the consumption of resources and energy.
- **Reuse.** It is the antagonist of the "use and throw" culture and the consumption of ephemeral and easily replaceable products. A strategy that strives for long-life products that do not become quickly residual but are re-used continuously, and for the search of practical solutions based on existing resources, without the need to acquire new products.

These two first alternatives (reduction and reuse) integrate what is called a set of **preventative** measures, as they prevent the generation of waste and therefore the problems that it can cause.

Recycling. Once prevention strategies ("the best waste is that which does not occur") have not been enough to stop the production of a waste product, it must be ensured that it receives the best possible treatment, both for the health of people as well as the environment. In this sense, recycling is the process that guarantees a better alternative for waste that has already been generated that serves as raw material to re-create new products. With this management, the saving of resources (materials and energy) is favoured by avoiding productive processes from scratch. Both the recycling and reuse mentioned above are strategies that are part of the paradigm of the **circular economy** in which waste would not exist as this would be essentially a resource.

However, to facilitate this transformation of waste to resources through industrial processes, it is necessary, however, that a correct selective collection be carried out beforehand that facilitates the differentiated management task of the different waste fractions. These fractions will depend on the provisions established by the competent waste management authority of the place where each sports competition is carried out, as well as the place where each waste should be dumped, a destination which is usually containers or green points (eco-points, waste collection centers, etc. installations where differentiated waste is stored by categories pending their transfer to recycling plants).

For example, a possible selective pickup configuration in a ski mountaineering race could be:

Table 1: basic scheme of selective waste collection

Waste fraction	Content	Destination
Containers	<i>cartons, bottles and plastic containers, cans, lids and bottle tops (in aluminium and plastic), paper and aluminium trays, cling film, polystyrene trays, etc.</i>	<i>Specific container (yellow) *</i>
Paper	<i>Office Paper, newspapers, magazines, cardboard.</i>	<i>Specific container (blue) *</i>
Glass	<i>Bottles and glass jars</i>	<i>Specific container (green) *</i>
Organic materials	<i>Food remains</i>	<i>Specific container (brown) *</i>
Other	<i>Plastic boxes, batteries, electronic and electrical equipment, oil, camping gas, printer toners, plastic (flanges, etc.), wood, furniture, large items (banners, etc.), medicines, etc.</i>	<i>Green Point (eco-point, sorting center, rubbish depot, etc.)</i>

** shape and colour characteristic of these containers also tends to change depending on where we are.*

In this sense, all that waste that is not collected selectively is not likely to be able to be recycled and will have to be managed by other less desirable means, such as incineration and

landfill transfer, or in the worst case will become a waste spread uncontrollably in the environment, with the impact that it entails.

Towards a circular economy

As opposed to productive models and of linear consumption, the circular economy is the discipline that safeguards the integration of processes and products so that they do not produce waste through two basic mechanisms: by reducing production as much as possible and by re-using existing materials. Regarding the materials, the theory of the circular economy divides them in two categories: biological and technological. In the case of the former, they can return to natural systems as nutrients when they have finished their useful life through biodegradation. Regarding the technological elements, made from artificial materials, they will have to be re-used continuously with the aim that they do not produce waste. This model of economy gives major importance to the optimization of the designs and the processes, with philosophies like the one known as a from the cradle to the grave, a paradigm that looks to conceive the products in all their life cycle, from birth until they “die”, that is to say, when they become waste. Regarding energy, the circular economy also promotes the exclusive use of renewable sources that do not cause waste or an impact on the surroundings.

2.2.3. Mobility

Although this section can be understood in terms of a subject area of the race, it remains also an environmental vector that integrates the movement and transportation of people and materials and the environmental consequences of these both for members of the organization (including volunteers) as wells as teams and runners, the general public and the media.

Knowing what they are and derivatives of these environmental movements and trying to make them more efficient is a very interesting way of working to improve sustainability in these events.

In practice, mobility and transportation is carried out almost entirely by motor vehicles ranging from freight vehicles (vans, etc.) to vehicles for the displacement of people (private cars, buses), as well as special vehicles serving in the mountain areas for questions of logistics or safety (snowmobiles, ratracks, helicopters). Another means of transport also present at these events and often outside the control of the organizers is provided by the lifts and cable cars of the ski resorts where the competitions are held.

The consumption of petroleum derivatives of all these vehicles involves the emission of polluted substances such as carbon monoxide, sulphur and nitrogen oxides, volatile organic compounds, fumes and particles. These substances have a direct effect on the atmosphere and are the main cause of the reduction in the quality of the air we breathe.

In turn, combustion engines are also a source of emission of greenhouse gases, substances such as carbon dioxide (CO₂) that despite having no major effects on the quality of the air are nonetheless responsible for the climate change phenomenon. This issue is of particular interest to calculate the carbon footprint of the event.

Finally, motor vehicle traffic causes noise and disturbance which may be important if transiting areas with presence of sensitive wildlife.

For these reasons, in order to achieve a more sustainable race in terms of mobility it is necessary to reduce and rationalize as far as possible the number and scope of motor vehicle journeys that take place in every group associated with the event. A tool used to assist in the

reduction of mobility is precisely the development of a *mobility plan*, to optimize the movement of people and materials and avoid unnecessary journeys, especially those of the most polluting vehicles such as helicopters.

2.2.4. Buying green

Responsible consumption is the alternative to the traditional consumption model proposed from the culture of sustainability. It is based on its own principles: to satisfy our needs with the least negative impact on the environment resulting in positive synergies and added value for the society (equality, social justice, solidarity and respect for human rights).

It is not a single action, but involves a process that includes several phases. In this sense, buying green is the first part of the chain of responsible consumption, because the action involves choosing and purchasing goods and services that respect the principles of responsible consumption and, therefore, to ensure environmental sustainability and social development.

Understanding and assessing how the organization of a ski mountaineering race provides goods and services (suppliers, type and origin of the products, etc.) is key to ensuring the improvement of sustainability while becoming an important tool to raise sensibility and environmental awareness both internally and externally (exemplary social responsibility).

The three main areas that define the model of responsible consumption and green purchasing in an event of this type are related to the proximity principle, characteristics and origin of these products. Thus, it is important:

- To choose *local products and suppliers* (kilometre zero). Having a shorter geographical and temporal path, these products have obvious environmental and economic benefits; to minimize the costs of distribution and transportation and contribute to strengthening the economic fabric of the primary sector at local and regional level.
- To invest in and prioritize *suppliers and products with low environmental impact*. In this case, once again the reduction in the production of waste is the key concept and good planning can be applied in the purchase and supply phase of the competition, mainly by investing in products that are renewable (or reusable) or minimizing waste of materials, such as eliminating unnecessary packaging and containers, opting for large formats instead of pods (not disposable products), etc.
- To opt for products which have *certified their sustainability*, such as those from organic production, the eco-labelled products and fair trade. In this way we ensure that the materials and services incorporated in the competition have been produced sustainably with environmental and social safeguards and also provide an added cultural value. An easy way to identify these products and suppliers are eco-labels and environmental certifications. At the same time, care must be taken not to include in the event products (goods or services) that have been produced without ethics or respect for human rights or the environment, so it is necessary to be well informed about what is being purchased.

In any case, although the philosophy of green buying can be applied to any subject area of the event, it is especially important in the area of catering as it is perhaps the area where there is the most consumption potential and where there may be more episodes of waste, particularly in food. Another area which is also quite important to apply criteria for green buying and responsible consumption is the area of communication, especially with regards to the production of printed materials for dissemination.

2.2.5. Water and energy

Any event involving the concentration of a significant number of people will involve a major expenditure of water and energy to meet their needs: hygiene, comfort, electric lighting, air-conditioning. In fact, in recent years, water consumption has soared (today a European citizen consumes an average of 300 liters / day although the water consumption indicated by the World Health Organization as appropriate is 80), as also happens with energy consumption growing annually by 2%.

In practice, the quantitative and qualitative pattern of consumption of water and energy in an event of this type will depend, at first, on the sum of the individual behaviour of all members of the event, as well as the characteristics of different areas where this consumption occurs many of them far away from what is strictly speaking the course (hotels, conference centers, etc.).

To assess how sustainable water and energy consumption would be and leaving aside the difficulty and complexity to systematize the different consumption patterns of all the people involved in the competition, most likely the most significant is the related subject area that involves spaces. Not surprisingly, the choice of these and respect for a number of basic principles of efficiency will determine the magnitude of the cost of water and energy.

In this sense, the key to improving sustainability criteria in relation to these two vectors is to *reduce and make more efficient* overall spending of water and energy of the event, a goal that involves investing heavily in areas which respect a number of basic principles such as:

- The efficient use of water and integration of water saving systems at water points (showers, toilets, etc.).
- Optimization of the use of both sunlight and more efficient artificial lighting systems such as LED lights, as well as electronic equipment of a higher energetic category.
- Integrating systems to save energy in lighting such as timers, motion detectors, etc.
- Make responsible use of air conditioning, adapting well the comfort temperature, and ensuring that the areas are equipped with systems for energy efficiency (insulation, etc.).
- Integrate the use of clean and renewable energy (solar, wind, biomass, geothermal, etc.).

2.3. The assessment of impacts

Having listed the subject areas into which the logistics of the competition can be divided and the main environmental vectors to consider, it is important to identify and describe the impact that each ski mountaineering race can generate depending on their casuistry.

Now, not only is it important to do this descriptive exercise about the consequences that the set of actions carried out can have, but it is also essential that the matrix of impacts assesses the quantitative and qualitative scope of these consequences. To characterize the extent of impacts different criteria can be applied to refer to the location, the durability or the severity of them, so that they can be classified as:

- *Direct impacts* caused by the activities directly located at the event or *indirectly* due to collateral activities (such as the operation of ski lifts where the competition takes place)
- Impacts in the *short or long term* depending on whether they only occur occasionally during event (such as noise) or may persist (such as a spill into the environment).
- *Depending on the severity*, we use a scale of impacts ranging from low intensity (not significant) to mid or high (serious or very serious including irreversible). In this sense, it is also important to consider the regulations of the territory where each competition

is held to know the legal constraints and impositions that exist for the different issues involved (nature protection, waste management, etc.)

An interesting tool when evaluating the scope of impacts is to have quantitative data are called *environmental indicators*. These items not only make it possible to track the environmental impact of a competition but they also enable one to see the evolution over time (between different editions) and, why not enable comparison between different events. For these reasons, it is important that commissions of sustainability of each race make an effort and persevere to produce reliable data to facilitate the preparation and monitoring of indicators.

In practice, this global and synthetic assessment of impacts can be named *array of impacts*, and usually takes the form of checklist in which quantitative and qualitative impacts are described and evaluated (as far as possible), while monitoring indicators arise that allow them to be contrasted and compared.

However, it is important to adapt every competition *checklist* of impacts to their own casuistry to obtain a more realistic picture of what might be the possible environmental impacts that occur. In practice, this synthetic classification will not only serve for that goal, or to get an idea of the degree of overall impact of the event, but ultimately will be essential to guide the priorities and guidelines requiring action to gradually improve the sustainability of the event (and, of course, to know what must be preserved which is already being done correctly).

The goal then is to know what and how things are done to act and change procedures and habits to more sustainable alternatives in environmental and social terms, not to mention the ability to expand this concept beyond the event itself.

A simple example of a generic array of environmental impacts for a ski mountaineering competition, considering the subject areas and vectors described would be:

Table 2: description of the environmental impact of a race and monitoring indicators

Subject Area	Action	Impact	Vector	Location	Timescale	gravity	Indicator
Course	Prospecting prior to the race	Disturbance to wildlife	BIO	Occasional	Short	low	
	Prospecting prior to the race	Possible uncontrolled dumping	WA	Occasional	Short	low	Kg of waste
	Markings/ re-markings	Possible uncontrolled dumping	WA	Occasional	Short	low	Kg of waste
	Avalanche prevention (use of explosives)	Physical alteration of the environment	BIO	Occasional	Short / Long?	medium	Detonations kg of material
		Polluting emissions	MOB	Indirect	Short	Medium	Emissions, gasses
	Race	Disturbance to wildlife	BIO	Occasional	Short	low	

	Race	Possible uncontrolled dumping	BIO	Occasional	Short	low	Kg of waste
	Disassembling	Disturbance to wildlife	BIO	Occasional	Short	low	
	Disassembling	Possible uncontrolled dumping	WA	Occasional	Short	low	Kg of waste
	Means of transportation (snowmobiles ratrack)	Disturbance to wildlife	BIO	Occasional	Short	low	
		Pollutant emissions	MOB	Indirect	Short	Medium	Kms of journeys fuel consumption
	Helicopter	Disturbance to wildlife	BIO	Occasional	Short	Medium	
		Pollutant emissions	MOB	Indirect	Short	high	flights fuel consumption
	Spectators	Possible uncontrolled dumping	WA	Occasional	Short	low	Kg of waste
	Transportation of spectators	Pollutant emissions	MOB	Indirect	Short	Medium	Nº and kms of journeys, nº of people, fuel consumption
	Gondola lifts	Pollutant emissions	MOB	Indirect	Short	Medium	Nº of hrs of operation fuel consumption
	Loud speakers	Disturbance to fauna	BIO	direct	short	low	Decibels
Catering	Race refreshment stations	Production of waste (packaging, organic, etc.)	WA	Occasional	Short	low / medium	Kg of waste fractions
	Group meals	Production	WA	Occasi	short	low/	kg of waste

		of waste (packaging, organic, etc.)		onal		mediu m	by fractions
	Transport and logistics of Suppliers	Pollutant emissions	MOB	Indirect	short	mediu m	Nº of Kms of journeys and fuel consumption
Areas	Services for competitors	Water consumption	WAT	Occasional	short	low	Litters of water consumed
		Power consumption	ENE	Occasional	short	low	kW consumed
	Newsroom	Production of waste	WA	Occasional	short	low	Kg of waste
		Power consumption	ENE	Occasional	short	low	kW consumed
	Dining-rooms and common areas	Power consumption	ENE	Occasional	short	low	kW consumed
commu nication	Communication and advertising materials (flyers, posters ...)	Consumption of paper and ink	WA	occasional	short	low / mediu m	# materials Kg of paper
	information material for competitors / teams	consumption of paper and ink	WA	occasional	short	Low	# materials Kg of paper
	Press dossiers	Consumption of paper and ink	WA	occasional	short	Low	# materials Kg of paper
	Merchandising	Packaging	WA	occasional	short	Low / Mediu m	Kg of waste

BIO: biodiversity WA: waste, MOB: mobility, WAT water, ENE: energy.

3. Taking Action: good practice for a more sustainable race

Once the work has been carried out to diagnose the potential environmental impacts associated with the competition it is time to take action with a view to avoiding the negative effects that may occur and enhance the positive synergies that may exist.

In practice, as revealed by an array of impacts of a ski mountaineering race, the overall environmental impact of an activity of this type is generally **low**. In particular:

- The effects related to the physical and biological environment are often considered insignificant given that the impact is localized and short term, because the competitions are developed mostly in areas which have already been developed as ski runs and thus anthropized. The only exception where it is important to pay more attention is to the effects arising from *the use of explosives*.
- The environmental impacts registered in other vectors are usually also *low*. But if you want to improve the sustainability of the event it is particularly important that measures are taken to limit the *widespread production of waste*, particularly in catering and expendable materials, and reduce the impact of **mobility** and **consumption of energy** especially contaminating emissions.

It will, therefore, be from these key issues where it will be particularly important to implement action steps of the race, a phase that the ISMF identifies as the conduction of an "**Environmental Program**", an environmental action plan containing all activities to be undertaken to achieve the objectives set out as environmental standards. Similarly, to what happened with the "*Report of Environmental Analysis*," where according to the ISMF regulations it is necessary that each LOC has this environmental program, where for each objective there is a description of actions (procedures, human and monetary resources, people in charge, etc.).

It is important that this environmental program be evaluated every year and updated with the revision both of monitoring indicators such as the inclusion of the progress and improvements that occur both in the organization of the event as possible new ones that may have developed in the region where the competitions take place (change in regulations, etc.).

As for the actions that make up the environmental program, it is important to characterize them based on the *moment* they are applied and the possible impact on environmental issues. Thus, it is usual to speak of:

- *Preventive measures*; implemented to avoid negative consequences and impacts before they occur.
- *Corrective measures*; implemented to reduce the negative consequences when this event is taking place.
- *Compensatory measures*; implemented at the end of the event to address and mitigate the negative effects that could not be prevented or reduced.

At the same time, it is important to determine the *priority* of the measures of the environmental program. Overall, this priority is usually related to the *severity* of the impact to be solved and thus we speak of:

- *Compulsory measures*; those which are essential to ensure that the race is responsible for the environment and human health. It is usually applied to correct serious or very serious impacts and to comply with existing regulations.
- *Necessary measures*; those which are important to address negative impacts of medium and low severity and to ensure a significant improvement in sustainability.
- *Optional measures*; additional measures if you want to help reduce the impact to little or no significance.

Considering these assumptions, a set of proposals has been grouped together aimed at improving the overall sustainability of the ski mountaineering races and divided into different

subject areas which defined and characterized by the moment of application (PRE: preventive measures, COR corrective measures, COM: compensatory measures).

3.1. Course

Table 3: Good Practice on the course

Aspect	Action	PRE	COR	COM
Markings: vertical signs. Usually banners, ribbons, poles or nets distributed at varying intervals depending on the topography of the course or area (and places for exchange, departures and arrival, etc.).	Limit the use of consumables to the strictly necessary.	x		
	Ensure proper anchorage to prevent dispersal in the event of strong winds.	x		
	Check the status of the environment before the race (photographs to compare, inventory of markings installed)		x	
	Re-use material for markings at later editions		x	
	Use flanges and colour ties (preferably black) to stop them getting lost in the snow.		x	
	Limit advertising banners to arrival and departure areas		x	
	Review and do a methodical clean up after the race.			X
Markings: signs in the snow. Usually carried out with <i>aniline</i> (usually start and finish lines). The main impact of this compound is linked to possible localized episodes of chemical contamination.	opt for organic dyes as an alternative to using aniline.	x		
	If using aniline, it is recommended not to mix it with antifreeze (alcohol or other industrial liquids) to reduce the impact of chemicals on the environment.		x	
Safety: temporary and permanent facilities on the course. Anchoring, points of suspension and safety, posts, plaques, chains, etc.	It is preferable that plaques be made of black stainless steel to avoid the effects of reflection and facilitate their visibility in the snow.		x	
	Recover anchors and other equipment that could be removable.			X
Safety: preventing avalanches. Using explosives.	opt for lower-impact explosives (Ex. Goma-2 ECO does not include DNT and reduces emissions of nitrogen oxides)	x		

	and CO ₂ by almost 70%)			
	Rationalize the number of explosives and limit the number detonations to that which is strictly necessary		x	
	Clearing and recovery of waste from explosions (fuses, cables, etc.) if necessary			X
Uncontrolled dumping Presence and dispersion of waste on the course.	Set sanctions if competitors leave waste during a race (regulations)	x		
	Enable and inform about waste collection points at refreshment stations on the course and ensure that these points are located in easily accessible places.		x	
	Check the status of the environment before the race (photographs to compare)		x	
	Provide volunteers and members of the organization with waste collection bags.		x	
	Methodical review and clean up after the race.			X
	Public. Aspects related to the hyper frequency of people.	Enable areas to concentrate the public and avoid the dispersion of people around the course	x	
Installation and information about points of selective waste collection (existing ones can be used if it is a ski resort)			x	
Provide volunteers and members of the organization with waste collection bags.			x	
Methodical review and clean up after the race.				X
Noise. Using loudspeakers during race.	Ensure that the volume of stereos does not exceed the legal or recommended limits (70 decibels)		x	

⁵ Aniline in snow and water (superficial or subterranean) will largely be transformed by bacteria and other microorganisms. It can reach the ground where it will partially adhere to sediment and be subsequently transformed, or it could reach the air by evaporation, where it will be rapidly transformed by other chemical substances and by sunlight. Aniline does not

reach the food chain (U.S. Department of Health & Human Services, public information on the web). This compound has a point of fusion at -7°C, sometimes it is mixed with alcohol or other antifreezes to disperse it.

3.2. Catering

Table 4: good practice in catering and refreshment stations

Aspect	Action	PRE	COR	COM
Refreshment stations	Prevent food waste. Careful planning and optimization of the preparation and serving of the right amounts of food, as well as care and control of the proper conservation of raw materials, in all refreshment stations.	X		
	Serve food in bulk (no packaging)	x		
	Avoid single-doses and choose large formats for drinks and food.	x		
	Using reusable cups for drinks (avoid disposable plastic cups).	x		
	Opt for products from local suppliers and organic or eco certified products.	x		
	Install selective waste collection points for fractions.		x	
	Subsequent transportation back to collection points (containers, eco points)		x	
	Subsequent clean-up of dumped waste if necessary.			X
Group Meals Conducted away from the race course	Prevent food waste. Careful planning and optimization of the preparation and serving of the right amounts of food, as well as care and control of the proper conservation of raw materials	X		
	opt for local products and suppliers	X		
	opt for products from organic production or eco certified.	x		
	Avoid single-doses (sugar, salt, sauces, coffee capsules, etc.) and opt for large formats for drinks and food. Avoid products with unnecessary packaging and containers	x		
	Avoid bottled water - opt for tap water	x		
	Avoid disposable plastic products (cutlery, glasses, plates, etc.) – Use reusable dishes and glasses.	x		
	Installation and information about selective waste		x	

	collection points.			
	Subsequent transportation back to waste collection points (containers, eco points).		x	
	If necessary, distribution of leftover food to charitable organizations.			X

3.3. Areas

Table 5: good practice in sustainable management of areas

Aspect	Action	PRE	COM	COM
Choice of areas. Criteria to improve sustainability based on the allocation of areas for the event.	Prioritize local areas with the proper dimensions for race activities (capacity, etc.)	x		
	Prioritize areas and services (hotels, catering, etc.) which have eco certificates or an environmental policy.	x		
Habilitation of areas. In collaboration with the managers of the areas (companies, administrations, etc.) both indoors and outdoors (car parks, etc.)	Define and provide the necessary means to carry out selective waste collection (all fractions essential) to all activities taking place in the event (press, outdoor areas, etc.).		x	
	Implement procedures to report signs of continued environmental improvement (container location, best practice, etc.)		x	
Cleaning. If it is possible, determine the cleaning services of the areas occupied by the activities of the competition (press room, catering, etc.)	opt for companies that invest in a more sustainable cleaning. These companies tend to be <i>certified</i> (ISO, EMAS, etc.) and integrate criteria such as <ul style="list-style-type: none"> Avoiding the use of toxic or potentially polluting products Use eco products and natural products rather than synthetic chemicals. Rationalize the use of water and chemicals. 	x		
	Control of proper management of waste by cleaning services (that separation of waste is respected and transferred to the correct destination). In this sense, the company responsible for cleaning may be asked to submit a declaration of environmental responsibility.			x
Power Consumption.	Plan thoroughly in advance the	x		

With regards to good practice in electricity consumption for lighting and air conditioning.	distribution and use of areas, as well as only use the air conditioning and lighting equipment which is strictly necessary.			
	Unplug lighting and electronics devices and unnecessary air conditioning in areas after hours of use.		x	

3.4. Communication:

Table 6 good practice for communication management

Aspect	Action	PRE	COR	COM
Internal documentation. Internal materials of the organization for information and communication aimed at skiers / teams (regulations, briefings etc.).	Minimize the production of printed materials using digital alternatives (mail, cloud, USB stick, etc.).	x		
	If producing printed materials, use recycled or eco certified paper (chlorine-free or recycled) and use double-sided option.		x	
Publicity Material. (Posters, leaflets, magazines, etc.)	Minimize the production of printed material. opt for digital advertising.	x		
	If producing printed material, choose suppliers that guarantee use of eco certified.		x	
Merchandising. Retail products or gifts to participants and volunteers.	opt for local products (traditional) or eco certified value-added products.		x	

3.5. Mobility

Table 7: good practice in mobility

Look	Action	PRE	COR	COM
Helicopter flights. This is not to prohibit the helicopter, but to define its use during each event. It is, of course, a matter of context, location, time, weather, laws and procedures of the host country, etc.	Plan flights rationally and minimalistically (number of trips, routes, timetables, etc.)	x		
	Use drones for audio-visual recording.		x	
Transportation by ratrack and snowmobile. Movements of people and materials	Plan transportation logistics to reduce the number of journeys and improve efficiency	x		

within the course.	Avoid traveling in sensitive areas and areas outside course		x	
	Wherever possible, choose petrol vehicles instead of more polluting diesel		x	
Transportation of people. Individual / group mobility and public / private mobility associated with all members of the event.	Plan the mobility of members of the organization, participants, volunteers and press.	x		
	Implement group transport.		x	
	Promote the use of public transport to reach the race areas		x	
	Wherever possible, choose cleaner vehicles (electric, hybrid) or petrol instead of more polluting diesel to carry out the mobility of people from the organization.		x	
	Encourage vehicle sharing experiences among all race groups, especially volunteers and spectators.		x	

4. Social Responsibility

Beyond the fact of not leaving a trace or reducing their ecological footprint, any event that aims to consolidate a higher level of sustainability should be able to include a section related to social responsibility. This is directly linked to the ability of such events to promote collective initiatives and actions that go beyond the event itself and can contribute positively to improving environmental and social performance.

In this regard, three examples of good practice specific to social responsibility projects that today are within the capability of the organizers of a ski mountaineering race are *initiatives of information and communication, contribution to external projects of social and environmental value, and the offsetting of CO₂ emissions.*

4.1. Environmental Information and Communication

Based on the principle of shared responsibility, as well as good practice that all organizations should consider, much of the success of achieving a more sustainable event necessarily implies the integration of the joint work of participants. Key to this is the implementation of environmental communication and awareness initiatives that allow the sharing of criteria and points of view of an event that aims to be more sustainable and in this way work them together.

Therefore, in parallel with making the event more sustainable it is important to move forward initiatives and actions which throughout the process of the race stimulate environmental awareness and information among the various groups involved:

Target public	Goal	Actions
---------------	------	---------

Athletes	Improve information and experience of skiers	Dedicate an area to information on environmental characteristics and on appropriate behaviour during races and briefings.
Organization and Volunteers	Improve training and information on environmental issues. (<i>Training and information for the persons involved</i>).	<ul style="list-style-type: none"> • Increase the sustainability committee within each LOC. • Internal training sessions on sustainability and the environment for the entire organization and volunteers.
Fans (general public)	Provide all spectators information about the environmental policy of the event and how to contribute. (<i>Training and information for the spectators</i>) Promotion and information about the environment, culture and tourism.	<ul style="list-style-type: none"> • Design signs and information materials for the public. • Provide opportunities for participation in environmental matters (web, social networks) • Enable a space dedicated to communicating sustainability on the website.
Media	Improve understanding of the environmental policy of the event and raise awareness of environmental issues.	<ul style="list-style-type: none"> • Provide information kits to spread the environmental program of the race. • Active participation in media

4.2. Contribution to projects

An event of this kind, involving a significant number of people connected to the world of sport and its ethical principles can be an important engine for other improvement initiatives of social and environmental sustainability to be carried out beyond its own limits, through the promotion of social responsibility initiatives.

These projects are normally transported through third parties, such as groups and social organizations, NGOs, schools, etc. which can be either from the *territorial context* where the competition is being held and *outside of it*, and therefore tend to treat *environmental issues* (including environmental initiatives as recovery or rearrangement of paths and tracks, projects for the management local flora and fauna, grants for environmental studies, etc.) and *social solidarity* (such as initiatives to combat poverty, inequality or projects to contribute to the improvement of education, health, social integration, etc.).

Typically, the contribution to these projects can be done in the following terms:

- *Financial*. It involves giving money to finance these projects and initiatives. While the funding may come from the organizers (allocate part of the budget for these purposes, as popularized by campaigns such as 0.7%) or through the contribution of sponsors, you can also choose to apply an eco-tax to participants and get them to contribute through part of the price of registration for the event.

Non-financial. Initiatives that do not involve the exchange of money, such as the direct donation of material goods (sports equipment, school supplies, etc.) to charitable causes. Another alternative is the provision of services in return for other services, in terms of a "time bank", such as teaching skiing in exchange for these people to help clean up mountains.

The solidarity contribution of the Font Blanc competition (Andorra)

In the 2017 edition, the Font Blanca race wanted to contribute to a solidarity project promoted by the NGO *Muntanyencs per l'Himàlaia*. The initiative consists in that in exchange for the present for participating, both volunteers and members of the organization donate a piece of technical winter clothing which is then sent to the children of Nepal where is NGO is operating.

4.3. Compensation of CO₂ emissions

As we have seen throughout this document, zero environmental impact is an elusive goal in an event of this kind as it includes activities that inevitably involve an environmental impact, direct or indirect, and although they can be reduced they cannot be removed completely with the technology and the means currently available.

An example of this is mobility. And although you can practice "clean" mobility such as walking and go on foot, and displacements can be greatly reduced, in practice an event of this kind involves a large number of displacements by motor vehicle, and therefore the emission of pollutant and greenhouse gases. Although this cannot be eliminated, there are now mechanisms that allow you to offset greenhouse gas emissions and convert them to neutral carbon.

In practice, the procedure to offset emissions involves the calculation of the tons of CO₂, which have been emitted to the atmosphere directly or indirectly due to the different activities carried out. These not only consider the mobility of vehicles, but also calculate other items such as energy consumption for lighting, air conditioning, etc. and raw materials (food, water, paper, etc.)

Once you have the number of CO₂ emissions₂ associated with all activities of the race, compensation is through the purchase of so-called carbon credits, a service that costs money and is offered by entities that capture CO₂ instead of emitting it. Thus, the emissions that occur in the event or any other activity are neutralized by another activity that is "pulling" them from the atmosphere elsewhere in the world (the market for emissions is usually worldwide). In particular, the capture of CO₂ is usually carried out through initiatives or projects related to energy production from renewable sources, decarbonization of technology, planting trees, etc. The cost of the compensation of emissions can be met by the organization of the event, but it is also possible that all or part of this procedure is covered by a sponsor (companies, organizations, etc. that want to contribute in terms of Corporate Social Responsibility) or by the participants themselves (usually tends to be a voluntary contribution).

In addition to the environmental benefit represented by compensation (fight against climate change), this procedure ends with the recognition in the shape of a distinctive environmental badge (certificate) confirming that the event is carbon neutral. These environmental distinctions give great added value to the communication of events and companies as they show the quality of an environmental policy.

Compensation of carbon in the Font Blanca Competition (Andorra)

The Font Blanca competition was the first ISMF competition which took the decision to compensate their emissions and become at the same time one of the first mountain sporting events with neutral carbon and confirmed with the stamp Clean CO₂ Certified. Thus, their

environmental plan has included since 2016 the calculation of the carbon footprint (quantified as the equivalent of approximately 5.6 tons) and the purchase of credits which have contributed to the financing of projects for social and technological development in different parts of the world. This improvement of the environment has been possible thanks to the contribution of the environmental consultancy Lavola (Spain).