

Francisco Ferreira

MANUAL OF GOOD ENVIRONMENTAL PRACTICES IN SPORT

ENVIRONMENTAL ETHICS



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ETHICS

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INTRODUCTION

WHAT ENVIRONMENTAL ETHICS REALLY MEANS?

Environmental ethics argues that our moral concerns and our decisions should include the environment and the need for sustainable development, once that the existence of human beings is closely related to the existence of nature, whose rights must be also taken into account.

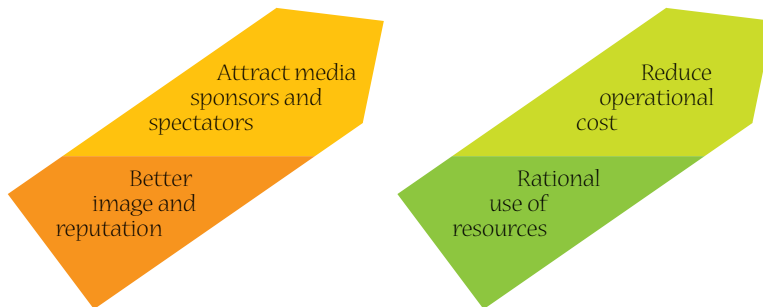
WHAT SUSTAINABLE DEVELOPMENT REALLY MEANS?

Sustainable development is usually considered to be a development that ensures the needs of the present without compromising the needs of future generations. It is, simultaneously, a way to understand the world as a set of complex systems (economy, society and environment) and a method to solve its problems holistically and comprehensively, where good governance emerges as a fourth dimension also to be integrated. To ensure a sustainable development of a planet with excess population, innumerable social inequalities and significant problems of pollution, is one of our biggest challenges. (See Figure with the domains of sustainability)

WHY SUSTAINABILITY IN SPORT?

Sport presents an enormous set of opportunities to promote environmental awareness, developing differentiated actions and capacity building in society in the environmental, social and economic areas, in addition to motivating principles of responsibility, understanding and sharing. The sport, involving a wide range of interlocutors, from organizers to participants, encompassing sponsors, non-governmental organizations, media, and involving the public, seems like a perfect structure for actions related to a more sustainable future.

Sport is an extraordinary vehicle of information and contains examples for the entire population. All have a shared responsibility: organization, associations, schools, athletes and spectators.



Benefits for sustainability (AISTS based, 2014)

Sustainability in sport

What it is

Face like normal working mode

Do better, in an integrated and more efficient way

Use the tools, frameworks and existing knowledge

What it is not

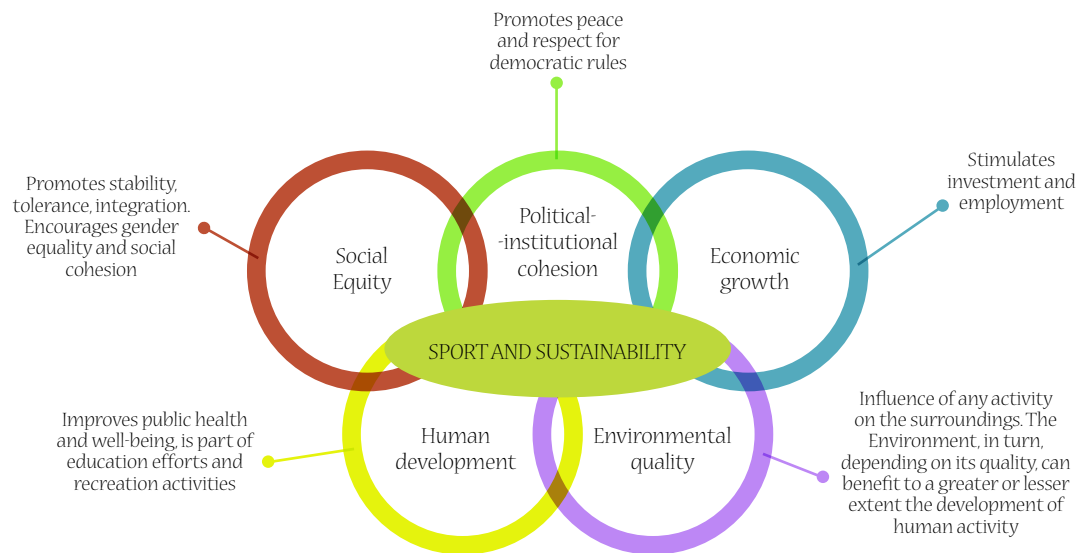
Another component to integrate the management of sports equipment or in organizing an event

Do more

Don't think all over again



Achieving environmental excellence should be a parallel path with the promotion and distinction in sport. From the everyday management of sports equipment, especially in schools, to the sporting events of different scale, sport can be a source of environmental innovation, from planning to implementation, from the drawing to construction, in water, energy, resources and transportation management. In addition, sport can be an example of respect for other ethical and social values. This is to motivate efficiency and to create a positive impact.



Sustainability in sport (ref. The Manual of Good Practices of Spain)



GOALS OF THIS MANUAL

The areas of the environment and sport are often in conflict when certain infrastructures or events cause impact on the use of resources, in nature, in climate or mainly on the nearest population.

Therefore, this manual intends to:

- Identify the key environmental issues that motivate a strong link between sport and the safeguarding of the environment, and the promotion of a sustainable development;
- Justify why sport and environment are a winning combination;
- Address the ten key areas in the approach of an event or sports infrastructure in order to promote sustainable development;
- Suggest indicators that may allow monitoring the performance of an event or sports infrastructure, mainly in environmental terms;
- Introduce some of the different environmental impacts associated with several kinds of sports.




WHAT ARE, ON A GLOBAL SCALE, THE MAIN ENVIRONMENTAL PROBLEMS THAT SHOULD MOTIVATE LOCAL ACTIONS?

CONSUMPTION AND DISTRIBUTION OF RESOURCES

Shortly after the beginning of the 19th century, the world population was about one billion people. With the advent of the industrial revolution and the improvement of health conditions, in particular the decrease in infant mortality, in just over a hundred years - about 1930 - humanity reached 2 billion.

From then on, the exponential increase became more evident, reaching 3 billion in 1960, 4 billion 14 years after, 5 billion in 1987, 6 billion in 1999, and coming up to 7 billion in 2011. By the 2040s, population is expected to reach 9 billion worldwide. About 40% of the planet area are urban areas and, predominantly, agriculture. The use of the soil is a critical aspect, because it interferes with the water cycle, the transfer of nutrients, habitats, biodiversity and existing ecosystems. The implications in terms of consumption of resources are huge



40% of the total earth surface is used for agriculture, leaving out desert and mountainous areas and important areas in terms of nature conservation, subject to increasingly intense pressure; 4.5 trillion cubic meters of water extracted per year, only about half being effectively consumed, wasting the other half; 100 million tons of fish are caught in the oceans, rivers and lakes, about 50 million tons from aquaculture to be added; about 4.5 billion tons of crude are extracted per year (approximately 90 million barrels a day); the amount of waste collected per year reaches 11.2 billion tons.

Another relevant aspect, in addition to the different levels of consumption, is the dissimilar form as resources and access to human rights such as education or health takes place between countries, within the same country or even in the same urban agglomerate. Fairness is crucial in the context of sustainable development, where the goal is to eliminate poverty and promote the quality of life for the entire population, maintaining the respect for the limits of the planet.




CLIMATE CHANGE

Climate change can be considered as one of the main environmental problems of the 21st century. The greenhouse effect provided by a set of gases in the atmosphere has been extended by a set of pollutants emissions, mainly carbon dioxide resulting from the combustion of fossil fuels such as oil, coal or natural gas. The huge dependency on these fuels in our society, often with an inefficient use, is the most significant contribution. Other pollutants, with an even greater warming potential, but emitted in smaller quantities, are methane (associated with livestock activities and degradation of waste), nitrous oxide (from fertilization in agriculture, sewage treatment, combustion and industrial processes), or several halogenated compounds as refrigerant fluids that we have in air-conditioners or refrigerators.

The result is a global warming that leads to consequences that are already taking place and will worsen in the coming decades, aggravated by the fact that we are simultaneously destroying extensive forest areas, able to absorb carbon dioxide, and that could thwart the process magnitude. Due to advances in climate science and modeling, we are more certain than ever that humans are responsible for most of the global warming and its impacts. Carbon emissions are responsible for much of the warming over the past 60 years.



- The increase in global temperature can reach 4.8 degrees Celsius between the periods 1986-2005 and 2081-2100.
- Climate changes are leading to more extreme phenomena: heat waves, heavy rains and rising sea levels (that may reach 98 cm between 1986-2005 and 2100).
- Environmental impacts are accelerating: ice layers are melting more quickly, the sea level rise is accelerating and the Arctic sea ice is disappearing at an astonishing rate.

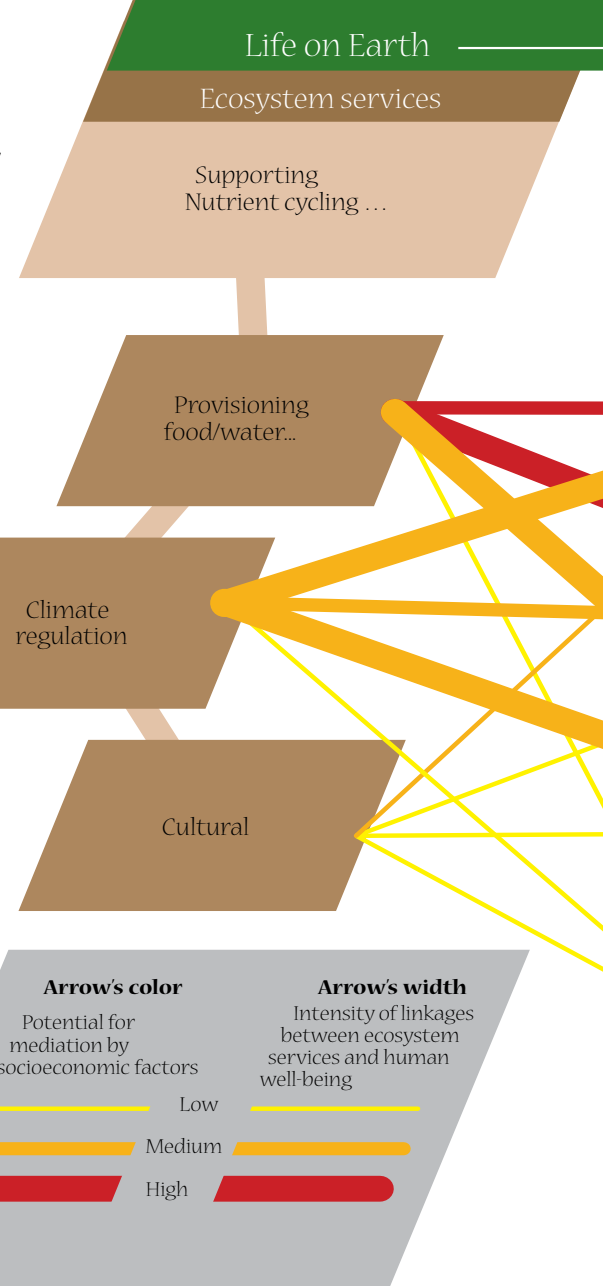
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- The oceans have absorbed a large amount of CO₂, which is causing an increase in acidity that can disturb catastrophically all the marine food chain.
 - In Portugal and Southern Europe, the risk of forest fires and, in particular, of huge fires will continue to increase, along with the risk of gales.
 - In Southern Europe, the frequency and extent of fires has significantly increased after 1970 due to the accumulation of combustible, climate change and extreme weather events.
 - Coastal flooding will affect between hundreds of thousands and 5,500,000 people, mainly in Southern and Northern Europe, if there is not an effort to adapt. Direct costs may reach 17 billion euros per year.
 - Summer tourism in the Mediterranean (and Winter tourism in the mountains) will decrease with increasing temperature.
 - The value of forests in Europe could fall by as much as several hundreds of thousands of million euros, and the incidence of wood beetles, fungi and diseases is expected to increase.
 - The warmer temperatures in the sea and ocean acidification will have impact on fisheries and the sea industry.
 - Climate change has affected and will continue to affect all aspects of biodiversity in Europe, including the time of spring migration of birds and its breeding season.
 - It is expected that suitable habitats for breeding birds of Europe will move almost 550 km by the end of the century. Up to 9% of mammals in Europe are at risk of extinction and to 78% can be seriously threatened. Currently, an invasive species reaches the Mediterranean Sea every 4-5 weeks - this rate is going to increase over time.

HABITAT DESTRUCTION AND LOSS OF BIODIVERSITY

The concept of biodiversity and ecosystem is crucial to understand its relevance. The ecosystem is the set of living organisms interacting with each other and with the environment, namely through a set of flows of energy and nutrients. Biodiversity consists of the variability that we find within each species, among the various species in the same ecosystem, and between the various ecosystems. Humanity has put the planet under a huge pressure, which has caused a dramatic increase in the rate of extinction of species, being estimated to be thousands of times higher than before the industrial revolution. The decrease in genetic diversity within the species and abundance of certain species are also visible effects.

Several authors consider that what is happening may correspond to

the sixth great extinction occurred until now on the planet. The loss of biodiversity does not have a single explanation, resulting from a set of factors that have interfered with the complex system that constitutes the functioning of the Earth. One of the most important aspects is our understanding of the services that are provided to us by ecosystems, illustrated in following figure.



Biodiversity

Constituents of well-being

Freedom of choice and action
Opportunity to be able to achieve
what an individual values doing
and being.

Security
Secure resource
access...

Basic Material
for good life.

Health
Feeling well...

Good social relations
Social cohesion...

- Mankind uses 40 to 50% of the resources generated by photosynthesis on a global scale, an extremely high and significant number. The use of soil to grow cereals, cattle, forest, is overpowering.
- Mankind altered the cycles of the carbon by the use of fossil combustibles and of the nitrogen, through its application mainly in fertilizers, while at the same time appropriating huge quantities of fresh water; introduced invasive species, at the same time as overexploited or even led to extinction many species on land and oceanic ecosystems.
- The number of existing species on the planet is estimated up to more than 5 million, but only about 1.9 million are known and described.
- More than 22 000 species - 25% mammals and 12.5% birds - are considered as threatened with extinction by the International Union for Conservation of Nature.
- In the last decades of the 20th century, about 20% of corals were destroyed and other 20% have been degraded due to warmer ocean temperatures, ocean acidification and the action of several pollutants. In the same period, about 35% of mangroves were also destroyed.


POLLUTION OF AIR, WATER AND SOIL

Pollution corresponds to the introduction of chemical substances or energy in the environment capable of causing a negative impact. The pollutants, whether chemicals or forms of energy such as noise, heat, or light, may have a natural or anthropogenic origin.

There's a whole set of forms of pollution affecting different areas of the planet (atmosphere, soil, oceans) and the respective ecosystems. Pollutants can be reversible or irreversible effects on organisms, can be or not bio accumulative, and its concentration can also be increased along the food chain (bio-concentration). Moreover, many pollutants may move between different means and suffer transformations that make them somewhat dangerous to living beings.

Among the different types of pollution, three kinds of pollution deserve special attention. Polluted air is associated with the emission of gases and particles coming from the industry or combustion engines in the various modes of transport. As for water, pollution is associated with the lack of treatment of domestic and industrial waste water, or other diffuse sources associated with urban and agricultural areas. In soil, pollution involves contaminants such as pesticides and herbicides. There are examples of other types of pollution that also have a significant impact on health or ecosystems, as it is the case of the noise.





Air pollution causes health problems, cardiovascular and respiratory, responsible for short and long term effects. The World Health Organization estimates that in 2012, world-wide, poor air quality was responsible for 3.7 million of premature deaths, most of which in countries in Western Pacific and Southeast Asia.

The destruction of the ozone layer was caused by a set of substances invented by Man, which have called into question, at planetary scale, that key mechanism (the ozone layer) of filtering by the atmosphere of the ultraviolet rays. In September 2006, a record was reached over the South Pole, an area of approximately 27 million square kilometers, where ozone concentrations were greatly reduced.

Excess nitrogen and phosphorus applied as fertilizers in agriculture or the nitrogen emitted into the atmosphere in combustion processes have been dramatically polluting the air, soil and groundwater, lakes, rivers, estuaries, and coastal zones. In surface water, the referred nutrients cause a huge growth of algae, which then die and are consumed by bacteria that will remove much of the oxygen present in the water, leading to the death of all other organisms that need it to breathe.

REDUCING THE FOOTPRINT ON THE PLANET

One of the most used ways of judging the impact we make on the planet is through the so-called “Ecological Footprint”, which can also be examined only in relation to some components such as greenhouse gases emissions that cause climate change (“Carbon Footprint”) or the use of water (“Water Footprint”).

The Ecological Footprint represents the productive area required to provide renewable resources and absorb waste resulting from human activity. The productive area occupied by urbanization is deducted, once it corresponds to soils that are not actually available.

ECOLOGICAL FOOTPRINT

Human activities consume resources and produce waste. Taking into account the increase in population and the global consumption, it is essential to measure the ability of nature to respond to this demand. The Ecological Footprint has emerged as one of the most important metrics, evaluating whether the planet is large enough to ensure the needs of humanity. On one side, the evaluation of bio capacity represents the biologically productive areas on the planet, including farmland, forests, rangelands, and fisheries. These areas, if not used, have an important role that is also counted as a way of absorbing and processing part of the waste that we generate, as well as our carbon emissions. On the other side, there is the humanity's quest for nature to meet their needs.

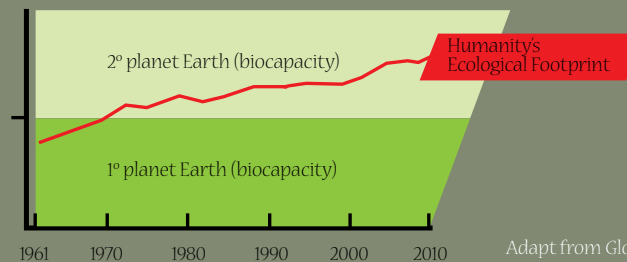




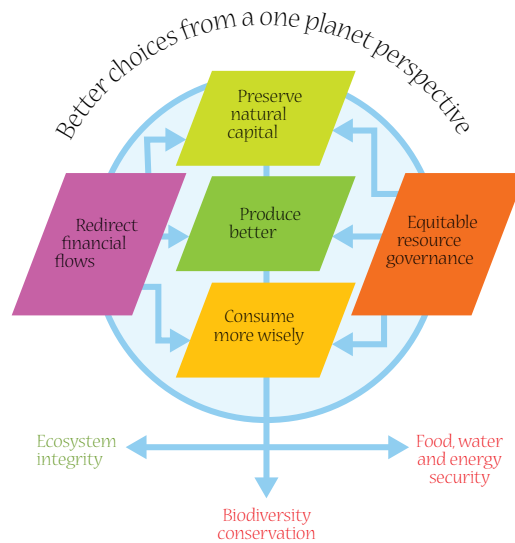
The calculations for 2010 of the Ecological Footprint Network show that we would need 1.5 Earth planets to ensure humanity's demand on nature, that is, for over 40 years we have exceeded the bio capacity of the planet, not regenerating resources at the same speed as we consume them, and so using many non-renewable resources and mortgaging the future. The units commonly used to express the Ecological Footprint per capita is the global hectare (gha), which corresponds to the total productive area to satisfy the demand. Note that the use of fossil fuels (carbon), has had a growth and gain a very significant weight in the total Ecological Footprint.

When measuring the footprint of a population, of an individual, city, company, country or all of humanity, we can assess our pressure on the planet, which helps us to manage our resources more wisely and act personally and collectively in support of a world where mankind lives within the limits of the Earth.

The Ecological Footprint of an inhabitant in Portugal in 2010 was approximately 4.5 gha.



Adapt from Global Footprint Network, 2014



Adapt from:
Global Footprint Network, 2015

CARBON FOOTPRINT

The relevance of the problem of climate change has led to the need to individualize the calculation of the Carbon Footprint - the total set of greenhouse gas emissions caused by a person, organization, product or event.

Whereas there can be emissions of different greenhouse gases (carbon dioxide, methane, nitrous oxide, and even the so-called f-gases), usually the calculation is simplified by evaluating only the carbon dioxide (CO₂). If you resolve to consider other species, usually the final value is expressed in CO₂-equivalent, and there are some conversion factors for different gases into carbon dioxide. Care must also be taken because the calculation must take in account either emissions or any carbon sinks, resulting in the net balance of the two referred components.

It must be noted that the carbon component of the Ecological Footprint is a little different from the Carbon Footprint, once the first means the amount of carbon dioxide in terms of land and marine area required to sequester carbon dioxide emissions.

The Carbon Footprint of an inhabitant in Portugal in 2012, considering the assessment made on the basis of the national emissions inventory, without entering the component of land and forest use, was approximately 6.8 tons CO₂-equivalent.



As a curiosity, 2.5% of United Kingdom emissions are associated with sporting events.




WATER FOOTPRINT

If all the water on the planet were put into a 5 liter jug, the amount of available fresh water wouldn't be enough to fill a teaspoon. With the increase in population, water needs are growing. Combining this factor to water pollution, it is estimated that in less than 50 years to come we will have exhausted the available drinking water. This scenario is due to the slow, fragile and very limited natural drinking water processing.



The average daily water uptake in Portugal mainland, in 2011, was 220 liters per person, according to the Regulatory Body of Water and Waste Services (ERSAR). Water wastage in Portugal is about 37.5% in the agricultural sector, 25% in the urban sector and 22.5% in the industry.



Water is a key element of sustainability and, as so, evaluations of the Water Footprint have already been started, being possible to make a rather simplified calculation, limited to the inventory of water consumption of a given activity or event, or in a more integrated and complex way, as World Wide Fund for Nature has made for Portugal in 2011 (WWE, 2011).

In the complex calculation of Water Footprint, three types of water are considered: "blue" water (superficial or underground water), "green" water (the water used in the agricultural crops associated to evapotranspiration, directly dependent on the rainfall, potential evaporation and the needs of each culture), and "gray" water (water associated with dilution and purification of wastewater).

The main component of the Water Footprint in Portugal is the "green" water, i.e. rainwater integrated into agricultural products. In this context, our country has a high dependence on imported virtual water because we import a lot of food.

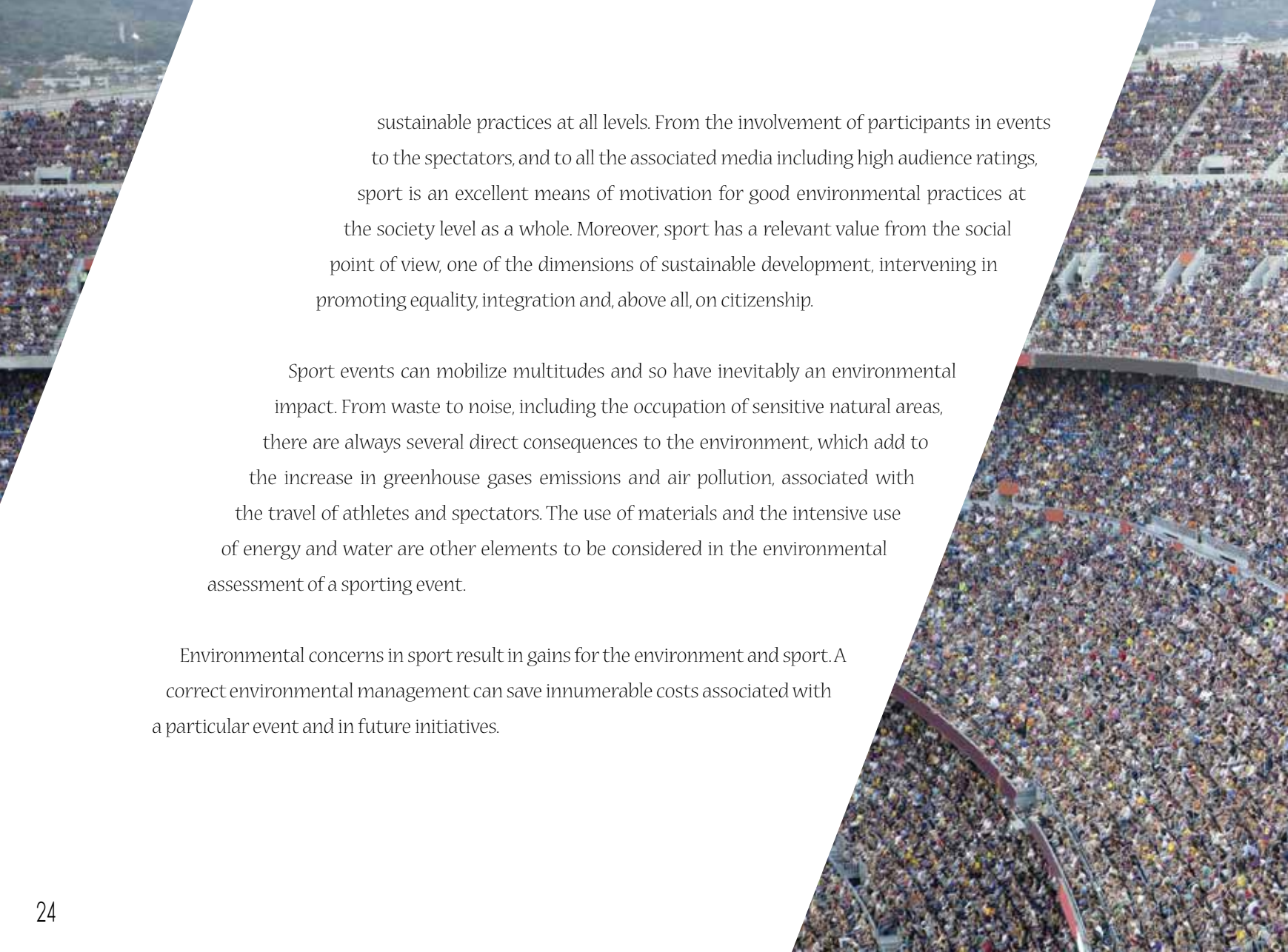


SPORT AND
ENVIRONMENT
A WINNING
COMBINATION

Sport creates quality of life, conditioning it at the same time, since many of the events, from the more casual to the largest and more organized ones, going through a lot of infrastructures, can influence positively or negatively the environment in its different areas.

Whereas sustainability goes through revitalization and respect for the local dimension, it is essential to give the right value to local cultures and traditions, respecting not only the environmental but also social and economic conditions, helping in the creation of a balanced relationship of the individual with himself and with the environment, invigorating increasingly outdoor activities, taking advantage of it and increasing the knowledge and respect for nature. In this context, the sport in nature has allowed a whole set of new practices, many of which are not institutionalized, leveraging multiple valences, such as nature tourism, within a framework of environmental education.


The multidimensional vision of sport, in the context of society and environment, must be as broad and inclusive as possible. In this way, sport should be approached as a broad concept, from competitive sport to a set of activities that should reflect community and individual characteristics and needs and which include, notably, activity in gyms, walks and outdoor games. In this context, the preservation of quality conditions in all kinds of indoor and outdoor environment is crucial to a healthy sport practice. It is appropriate to say that sports-related areas (health promotion, from consumption to technology, from entertainment to socialization, education and training) are an essential vector for integrating

An aerial photograph of a large stadium filled with spectators, viewed from a high angle. The stadium is packed with people, and the seating areas are visible. The image is partially obscured by a white diagonal shape that contains text.

sustainable practices at all levels. From the involvement of participants in events to the spectators, and to all the associated media including high audience ratings, sport is an excellent means of motivation for good environmental practices at the society level as a whole. Moreover, sport has a relevant value from the social point of view, one of the dimensions of sustainable development, intervening in promoting equality, integration and, above all, on citizenship.

Sport events can mobilize multitudes and so have inevitably an environmental impact. From waste to noise, including the occupation of sensitive natural areas, there are always several direct consequences to the environment, which add to the increase in greenhouse gases emissions and air pollution, associated with the travel of athletes and spectators. The use of materials and the intensive use of energy and water are other elements to be considered in the environmental assessment of a sporting event.

Environmental concerns in sport result in gains for the environment and sport. A correct environmental management can save innumerable costs associated with a particular event and in future initiatives.



Joining groups of people from all over the world in one place in major sporting events on an international scale is a unique opportunity to observe, acknowledge and encourage the use of good environmental practices, from the areas of construction to accommodation, sports venues, transport, water management, and energy. These events can also leave an important mark for the future in terms of sustainability, in particular when taking place in developing countries, where they represent a significant carbon footprint. In this context, the Global Environmental Facility (GEF, 2010) has supported a set of projects in the area of sports that are now examples on an international scale, including mass transit systems with low carbon emissions, the use of renewable energies, and other pioneering initiatives that remain after the completion of the events.

The protection of the environment and the promotion of sustainable development within the framework of sports activity is possible and desirable because:

- promotes the enjoyment of nature
- raises awareness about environmental problems;
- reduces resource use and pollution;
- promotes social inclusion (relationship between social groups, avoid of segregation and violence and the integration of people with disabilities).



THE ROLE OF THE OLYMPIC MOVEMENT - THE PROMOTION OF AGENDA 21

The Centennial Olympic Congress, the so-called Congress of Unit, that took place in 1994 in Paris, included a discussion on sport and environment, appealing, among other measures, to the inclusion of environment conservation in the Olympic Charter; in addition to the creation of a Commission on Sport and Environment within the International Olympic Committee. Thus, in 1996, a paragraph with this philosophy would be included in the so-called rule 2 of the Olympic Charter: "3. To encourage and support a responsible concern for environmental issues, to promote sustainable development in sport and to require that the Olympic Games are held accordingly." In this context, the promotion of sustainable development has become one of the fundamental objectives of the Olympic Movement, in full compliance with its priorities.

The 3rd International Olympic Committee World Conference on Sport and Environment in October 1999 appealed to the global sports community to adopt Agenda 21 within the Olympic movement as the basis for its policies and as inspiration for its action. In this same Conference the "Rio Statement on Sport and Sustainable Development" was adopted, broadly defining the actions for implementation of the referred Agenda 21.



The Agenda 21, associated with the United Nations Conference on Environment and Development, the so called Earth Summit or ECO/92, which took place in Rio de Janeiro in 1992, is a theoretical and practical tool that includes a set of concrete proposals for a sustainable development. The Agenda 21 identifies major global problems and promotes social and economic development together with the protection of the environment and natural resources.

Through the universality of sport, the Olympic Movement has the ability to take an active part in the measures in favor of a sustainable development. The International Olympic Committee decided to have its own Agenda 21. Basic concepts and general actions were thus defined to ensure an effective contribution of the Olympic Movement in this area. Agenda 21 applies from the Movement itself, to the sportsmen and the sportswomen in general, from the Olympic Committee itself to the International Federations, the National Committees, the Organizing Committees of the Olympic Games, the athletes, clubs, coaches, and all individuals and companies associated with the sport.



The Agenda 21 of the Olympic Movement must be implemented in a climate of respect for different social, geographical, climatic, economic, religious and cultural contexts, according to the diversity of its members.

Goals

Improvement of the socio-economic conditions

Conservation and management of resources for sustainable development

Strengthening the role of major groups

Areas of intervention

- The values of Olympism and its action on behalf of sustainable development
- The strengthening of international cooperation for sustainable development
- Combating exclusion
- Changing consumption habits
- Health protection
- Habitat and human occupation
- Integration of sustainable development concept in sports policies

- Methodology of environmental action for the Olympic Movement
- Protection of conservation areas and rural zones
- Sports facilities
- Equipment
- Transport
- Energy
- Accommodation and catering in large sporting events
- Water management
- Hazardous materials management, waste and pollution
- Quality of the biosphere and biodiversity conservation

- Promoting the role of women
- Promoting the role of young people
- Recognition and promotion of indigenous peoples

Sustainable development implies meeting the cultural and material needs of all individuals so as they can play a positive role in society. It is in this context that minorities and disadvantaged citizens into society should receive greater attention. Using the values of universality, the challenges of the Olympic Movement go through a policy of cooperation between the international institutions to regional scale. Also, the industry associated with sport is called to reduce the impact of its activity. With regard to social exclusion, it is important to encourage support for sports infrastructure in marginalized areas, supporting individuals and groups excluded by economic reasons, sex or race. The consumption of resources is another relevant aspect, where events, infrastructure and equipment should seek to minimize energy consumption, water, as well as the production of waste. In the area of health, a whole set of policies on nutrition, hygiene, disease-fighting should be promoted in sport, in addition to the efforts to combat doping. The promotion of sports infrastructures and major sporting events must beware of local conditions and integrate a harmonious development with the surrounding space. At institutional scale, monitoring mechanisms should also be created, following-up efforts made by the sport in this area.

The actions promoted by the Olympic Movement must fit in a spirit of sustainable development, promoting the preservation of the environment and being a proactive agent of environmental education. The respect for relevant areas in terms of nature conservation or with an important cultural heritage is essential. All the infrastructures should seek a reduction of their Ecological Footprint, giving preference to rehabilitation policies, landscape integration and boosting the local economy, using the least amount of materials possible, being these duly selected to avoid direct or indirect environmental impacts. The stimulus of consumption reduction measures, energy efficiency and use of renewable energy is critical, particularly in the component associated with the transportation of athletes and spectators, including all issues associated with accommodation and food. Water and waste management are two priority areas of intervention, where the minimization of consumption and reduction of production, respectively, are relevant. Reducing pollution and avoiding damage to ecosystems is also a crucial goal in sporting activity, ensuring and promoting biodiversity.

Finally, one of the major concerns in the area of sustainable development is the integration of significant groups of population who, for social and cultural reasons, do not enjoy the due equity or the investment they deserve in the energizing of sport and in the preservation of the environment for future generations. Indigenous peoples, a minority with very narrow connections to their environment, should also see their traditions encouraged in the comprehensive framework of the sport.





According to the International Olympic Committee:

- The athletes can only achieve their full potential if there is harmony between their mind and body which, for their part, must be in harmony with the environment.
- For elite athletes, the quality of the environment affects directly their performance. Furthermore, their respect for the environment and their participation in activities for the promotion of sustainable development should be part of their mission as examples to be followed.
- For a team, the respect for the environment and the involvement in activities that promote a sustainable development are among the principles of behavior and attitudes to pursue.
- For those who build sports infrastructures and for producers of sports equipment, the respect for protection of resources and environment is fundamental to the quality of their products, image and reputation.
- The media have a particular responsibility in educating the public and in the transmission of the image of sport, so the association to a sustainable development is also relevant.
- For the spectators, respecting the environment is an active form of personal involvement and helping to promote the sport they enjoy.

AREAS OF PRACTICE

The good environmental practices associated with the sport should be the result of a **continuous process that begins in the planning of activities**, being also a form of learning and construction of events that allows the creation of examples to be followed by other organizations and institutions.

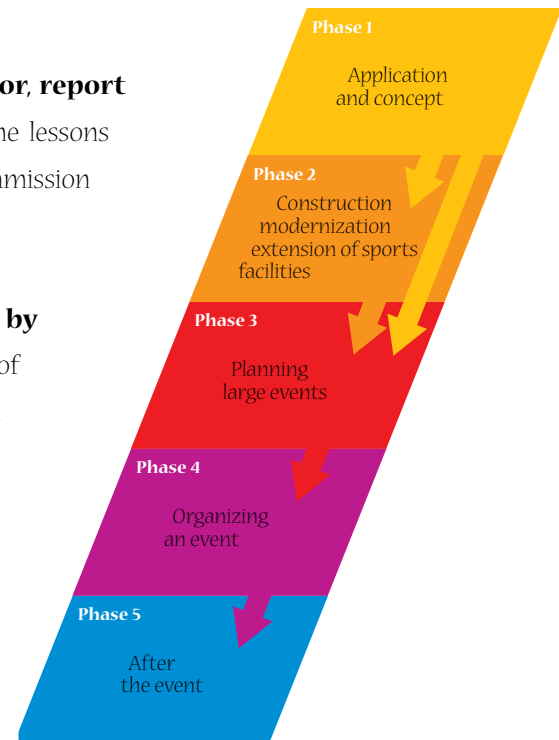
The incorporation of environmental issues must be done by conviction, with rigor, and promoting as integrated view of different disciplines and various experts, according to the size of the infrastructure or sporting event.

The development of an action plan identifying responsibilities, goals and communication with all interveners (from within the organization itself to athletes and spectators) is extremely important.

One of the main objectives should be **the ability to monitor, report and assess all the effort that has been developed**, the lessons learned and how to improve in the future. The existence of a commission or a commissioner of the environment is an organizational asset.

There are several practice areas, starting with a **general approach by an integrated environmental impact assessment**, then a set of critical aspects of management with an environmental dimension, but also with an economic and social dimension, ending with a crucial goal that is the promotion of citizenship and a healthy life, where sport and environment come together.

Phasing of organizing a sporting event (BMU, 2007)



Key aspects in sustainable approach of a sports event or infrastructure

ENVIRONMENTAL IMPACT	Minimize all the pollution that a permanent venue or the event itself can involve, either at the construction stage or in use or dismantling, such as dust, noise, or other disturbance factors of the surroundings. Prevent and reduce in an integrated manner any impacts associated to the various components detailed in the rest of this table.
ACQUISITION	Develop a supply chain with sustainability criteria and transparency. To avoid waste, standardize wherever possible and rent or hire rather than buy. Ensure the fair and timely payment to suppliers, especially small and medium-sized nearby companies.
ENERGY	Find ways to minimize the use of energy to reduce emissions and costs. Design facilities and infrastructures for a reduced energy use, by incorporating energy efficiency measures and maximizing the use of renewable energy.
TRANSPORT	Area included in the energy component but that deserves to be individualized. Choose the location taking into account the existing resources in the vicinity and the accessibility to minimize the need for transport of materials and people. Give strong priority to public transport and the use of low-carbon vehicles with high occupancy.
WATER	Minimize water consumption, in particular through water efficiency measures. Try to avoid using drinking water for purposes where this is not required. Avoid bottled water, which is carbon-intensive and creates waste.

MATERIALS	Use renewable raw materials, with low environmental impact, locally sourced where possible, without harmful substances and from sustainable sources.
WASTE	Avoid the consumption and waste in all stages of planning, construction and dismantling of infrastructure. If possible, use or upgrade an existing infrastructure. During the event, minimize waste through packaging reusable and recyclable, facilitating and implementing recovery options and correct destination.
BIODIVERSITY	Assess the site in terms of biodiversity and nature conservation requirements to ensure the maintenance or improvement of the habitat. Watch the alterations to be done in order to ensure the conditions and local heritage.
INCLUSION	Ensure that the infrastructure or the event is accessible to all ages, abilities, genders and cultures. Promote the participation of the local community, building pride and leaving a legacy. Provide training and education to improve inclusion.
HEALTHY LIFE	Promote health and well-being in the community. In events, stimulate local components as sustainable fair trade products.

#ENVIRONMENTAL IMPACT

The approach of environmental issues in the management of a sports infrastructure or related to a sporting event should consider, in an integrated manner, how to deal with the complexity of issues and areas within a sustainable development framework.

A formal **environmental impact assessment** is required only for large sporting infrastructures. In many cases, it is desirable to develop an environmental impact study or an environmental incidences study, open to the participation of the community. Even if it is not required, it is a good choice for smaller projects.

The **advance planning of sports activities** integrating environmental issues is a fundamental principle and that must go through the evaluation of the need to promote or not a certain event, having in mind that the distribution of responsibilities within the framework of a plan of action must be followed from the beginning. All the valences related to the management of an infrastructure or with the promotion of an event must take environmental commitments, and must be a cross-cutting dimension and not sectorial, called to act only in respect of some aspects.

It is very important, **if possible, to conduct a life cycle assessment** to minimize the materials and the impacts of techniques to be used, in particular involving the construction of infrastructures.

Climate protection is one of the elements that must deserve emphasis, given the consequences associated with greenhouse gas emissions and that relate primarily to the use of energy from fossil fuels, with an important weight in the transport sector.



In the framework of an integrated **assessment of environmental impact**, with variable degree of complexity, the calculation of the Ecological Footprint can be made, which enables to have data to help evaluate and compare the use of resources.

All personnel should be aware of and trained to save resources (water, energy, materials) associated with all elements of construction, management/operation or dismantling of a sports infrastructure, temporary or definitive. Moreover, much of the information collected throughout the environmental analysis can be used for clarification initiatives, awareness-raising, education and training of athletes, spectators and local communities, among others.

The maintenance of sports infrastructures takes a major importance in environmental terms concerning water consumption (e.g. in swimming pools) and energy (air conditioned buildings), in addition to the care with the use of potentially dangerous products and substances.





Green areas associated with sports infrastructures should deserve attention in order to minimize the consumption of water, fertilizers, herbicides and waste associated with equipment used on its maintenance.

Noise is a component of the environmental impact that is not often individualized but which is of great importance. The noise is not always a nuisance and can result from natural involvement of spectators. However, the big movement of crowds at beginning and end of events can affect residents, as well as the nature of the event can be disturbing for athletes themselves and spectators or even to the surrounding environment, as is the case for some motor sports.

It is essential to reduce the sound level used in certain sporting modalities to the minimum necessary to avoid annoyance to the neighborhood or to other participants (loudspeakers), or even as a way of preserving personal hearing (headphones).


There are sporting events that, because of its specific nature, are considered as noisy activities and require a special noise license, usually emitted by the City Council.



The **environmental management of organizations** is a crucial aspect of its operation in the framework of a sustainable development policy. There is European legislation and international standards that define and standardize the way that an organization can ensure the monitoring and the follow up of the environmental issues.


At European level, the **Eco-Management and Audit System (EMAS)** is a voluntary mechanism which aims to promote the continuous improvement of the environmental performance of organizations, through the establishment and implementation of environmental management systems, as well as the provision of relevant information to the public and other interested parts. EMAS was established initially in 1993, having been upgraded in 2001 and most recently in 2010, widening the participation in EMAS to organizations of different nature located inside or outside Europe.

In Portugal, about 60% of the population lives with noise levels above the values recommended by the World Health Organization, which has already considered that situation one of the greatest environmental problems throughout the European Union and the second in terms of health impacts, immediately after atmospheric pollution.



EMAS is a voluntary instrument at the disposal of any organization with activity in any economic sector, within or outside the European Union, wishing to: take an environmental and economic responsibility, improve their environmental performance, and communicate their environmental results to society and interested parts in general. Organizations wishing to register under EMAS should: prove that comply with environmental legislation, undertake to continuously improve their environmental performance, show their engagement in an open dialogue with all interested parts, engage the staff in improving the environmental performance of the organization and publish and update an environmental statement, validated by EMAS, for external communication. In addition, organizations must: place an environmental survey identifying all the direct and indirect environmental aspects and register in a competent agency, which must, before accepting the registration, have successfully completed the necessary verification. Once registered, organizations have the right to use the EMAS logo.

In general, an environmental management system of the EMAS type help organizations increase efficiency of resource use, reduce risk and set an example with its public declaration of good practices. The costs arising from the application of the system are outweighed by the savings it provides.



At international level, the International Organization for Standardization (ISO) has defined a set of standards that serves as tools for the different dimensions of sustainable development. ISO has a multifaceted approach in relation to the environment, to meet the needs of all interested parts in the areas of business, industry, government authorities and non-governmental organizations, as well as consumers. ISO has developed standards that help organizations to adopt a proactive approach to manage environmental issues: the family of environmental management standards that can be implemented in any type of organization in any public or private sector, from businesses to public services administration – the so-called ISO 14000.

ISO 14001 is the most recognizable structure in the world for environmental management systems that help organizations better manage the impact of their activities on the environment and demonstrate a good environmental management. It is a tool which should result in a better environmental performance, ensuring compliance with environmental legislation, the establishment of environmental objectives at all levels of the organization, the structuring of communication in environmental terms, the definition of an environmental policy adjusted to the reality of the company, identifying opportunities to improve the level of environmental performance.



PROCUREMENT

The area of procurement is very important in the context of a sporting event or in the construction and operation of a sporting infrastructure. **The choice of many of the equipment** necessary to support the event or associated with the infrastructures, as well as of many of the materials to be used for different purposes, must follow environmental criteria, where possible. For example, preference should be given to European eco-labelled products or produced by companies certified by European norm EMAS or international ISO 14001.

With regard to food, in particular, vegetables, recent studies have proved that it is cheaper to buy them in bulk than **packed**. Furthermore, the environment is grateful to the least amount of packaging associated with bulk purchase.

The more harmful food to our health have usually a greater environmental impact. In www.alimentacaosaudavel.dgs.pt, a handbook for a smarter diet is available in Portuguese, combining economic savings, nutrition and reduction of waste. Other recommendations can be found in www.who.int/mediacentre/factsheets/fs394/en/.

A lot of natural resources and energy is needed to produce a single bottle of water. Therefore, tap water, having all the necessary quality to human consumption, should be preferred, once that it does not involve the production of waste and avoids the spent energy associated with transportation and distribution.



The acquisition of miscellaneous equipment or products must take account of energy-efficiency criteria, water consumption, noise, among other variables – the energy label present in many equipment can be a precious help. In addition to always **promote the management priorities of reduction, reuse and recycling**, it is very important to consider also the life cycle of products. When choosing office equipment or purchase or use of vehicles, there is, for example, a selection of the more environmentally friendly ones in www.topten.eu.

The quality, the type of production and the origin of food products distributed or marketed in an event or sports infrastructure is important in order to integrate environmental responsibilities. The choice of menus must be made having regard to not only **nutritional but also environmental criteria**, preferring local products (minimizing transport needs), the season (minimizing conservation needs), and providing a higher return for the surrounding community. Meat consumption should be reduced, particularly red meat, since energy and greenhouse gases emissions (in particular of methane produced

Everyone should consume organic food, produced without the use of pesticides, synthetic fertilizers, preservatives or genetically modified organisms. The site www.agrobi.pt shows where to buy such organic products in Portugal.




To produce 1 kg of rice, 3000 liters of water can be necessary. Water saving is possible, not only in daily tasks but also indirectly through the food we eat. To buy not more than it is needed means to avoid waste.

by cattle). The best option is a feed from the first levels of the food chain (for example, cereals and vegetables, among others). With regard to fish, it is important the selection of species caught in nearby areas and respecting the minimum sizes. Whenever possible, the consumption of previously processed and stored foods should be avoided. It is also desirable the selection of products of biological origin, whose form of production can be confirmed by certification.

With regard to the **purchase of clothing**, articles (clothes, footwear) which are more multi-skilled should be selected, avoiding an excessive consumerism. The possibility of acquiring equipment and sports material produced from recycled material should also be evaluated.

With regard to **gifts and advertising objects**, it is important to reduce their consumption and ensure that suppliers consider not only their conditions of production from an environmental point of view, in terms of used products and their provenance, but also social concerns, regarding the involvement of child labor and conditions of workers' remuneration.





Many of the food we buy are not effectively consumed. The European Commission estimates that each domestic consumer produces, each year, an average of 76 Kg of food waste. We must not buy more than what we need.

At home or in the office, a good way to reduce the environmental impact of the used ink cartridges and toners is to opt for purchasing recycled printing consumables or refill the cartridges. The market already offers several solutions, ensuring quality and lower prices.

As for **cleaning of sports facilities**, cleanup actions that take into account environmental criteria can result in considerable economic savings, in addition to the minimization of environmental impacts. The use of adequate amounts of cleaning products, the preference for environmentally friendly products already available on the market, the use of reusable materials (rags, cloths), are simple principles to implement. Their handling must be careful, in conformity with the instructions, and they should be used and stored in appropriate places and with some ventilation.

Regarding to phytosanitary products to be applied in eventual green areas, there are several among them that, due to their characteristics, are less toxic to the environment. Fertilization and soil correction can be made with the use of compost (waste resulting from composting or organic matter resulting from a process of anaerobic digestion).

In addition to being a strong calling card of Portuguese country across borders, cork represents a versatile and resistant product that gives rise to more and more domestic and industrial application products. To promote its purchase also means to support the preservation of the cork oak and associated biodiversity.

#ENERGY

The **kind of sports has a strong influence on the amount of associated energy** - large stadiums require high power spotlights, motorsports need fuel for vehicles, enclosed spaces require consumptions such as for air conditioning.

For a proper use of energy, it is necessary to ensure that, in **enclosed spaces, there is natural lighting**, the lighting fixtures are high-efficiency (preferably LED), lit only when necessary, and regulatory systems of the light intensity may even set up according to natural light. Care should always be taken to ensure a good insulation of buildings and natural ventilation rather than artificial climatization, particularly the use of air conditioning.

In lighting, care must be taken when **choosing the lighting fixtures and lamps power more suitable** for the purpose in question.

The most appropriate lamps type are as follows:

- compact fluorescent lamps for lighting of small spaces (locker rooms, offices, corridors);
- tubular fluorescent lamps for lighting of large spaces (gymnasiums, halls, countertops);
- LED's (compact or tubular, depending on the room) - more expensive, but with greater durability; LED's can already be used in spotlight lighting.

The air conditioning heat pump, usually simply known as air conditioning, has this name because it can generate cold in summer and warm in winter. Being still rather costly, it is a very efficient equipment. Depending on each one's economic possibilities and when used in moderation, this can be an air conditioning alternative to be considered.

In www.topten.eu electrical appliances, lamps, office equipment and automobiles with improved energy performance can be found. A more efficient purchase will mean a lower consumption, greater savings and lower environmental impact.

In addition to the indication of the energy consumption of the equipment, the energy label shows info on other features such as, for example, water consumption or noise level. Buyers must be aware of this and, at the time of purchase, select the more efficient choice.

It is appropriate to select a set of lighting-related features (lumens, color, beam) tailored to local needs and the intended use. It is important to keep the lamp protectors clean.

As for the **glasses**, the same **must have adequate thermal characteristics** (there is already an energy label for windows that can help in the purchase), windows and doors should be properly sealed to avoid energy losses, and windshields or double doors may be used to avoid excessive air exchanges and consequent energy losses. It is essential to conduct analyses related to indoor air quality and ensure a good compromise with its warranty and energy efficiency. **Air conditioning system should only be turned on when needed in order to have a comfortable**, but not exaggerated, temperature (either too cold or too hot).

The European Eco-Label aims to promote the consumption of products and services with a reduced environmental impact during its complete life cycle, thus contributing to the efficient use of resources and a high level of environmental protection. By electing equipment or services presenting this label, one knows that a good choice is being done.



If the use of fuel is necessary, biomass is the preferred fuel followed by gas, being very important the recording of consumption as a monitoring action. It is recommended a careful maintenance of HVAC systems, in particular to evaluate losses of any halogenated compounds that damage the ozone layer used in heat pump and air conditioning systems.

In swimming **pools**, the adequate control of water temperature is a fundamental way to ensure the compatibility of comfort with energy savings. The use of solar collectors for heating water of swimming pools or spas, even if supplemented with a boiler, is a very important measure, in a countries with great opportunity for the exploitation of solar energy.

On the **premises with kitchen**, there is a set of relevant actions for energy saving, covering the pots and pans on the stove, avoiding open the oven, correctly managing the refrigerator (ensure the door shut, a good insulation of the seals, proper temperature and installation of the refrigerators away from the walls and heat sources). The acquisition of appliances should follow efficiency criteria as regards the use of water, energy and noise.

Did you know that:

Rechargeable batteries, more durable and with a lower environmental impact, should be preferred. The use of 1 kWh with non-rechargeable batteries have the same effect on global warming than to go 457 kilometers by car. With rechargeable batteries, the equivalent run would be much smaller, only 16 kilometers.

Almost 5% of the energy bill of a building comes from invisible consumptions. In fact, some equipment is consuming even when they are switched off or in standby mode. These consumptions, known as off-mode and standby, can be reversed if power supplied through a socket with a mechanical switch.

It is essential to ensure a regular cleaning of lamps or glass protectors, so that all of the spent energy will be used. The accumulated dust reduces the intensity of the emitted light, giving the wrong idea of malfunction or need for more power.

In rooms where halogen spotlights are used, dimmers can be installed to adjust the light intensity. By downloading the current intensity, the luminosity and the associated energy consumption will be reduced. Halogen bulbs can be replaced for equivalents of much greater efficiency, such as LEDs (Light Emitting Diodes).

In kitchens and bathrooms, the existence of tubular fluorescent lamps is common. In these cases, the preference for electronic ballasts instead of conventional ones allows the reduction of energy consumption by 30%, once the need for heating is reduced and, furthermore, the intensity of the light can be adjusted. However, LED lamps are the best choice.

40% of the public lighting is wasted due to inadequate lamps and projectors or to their misdirection. The waste of energy resources and the nocturnal ecosystems imbalances are two of the consequences of light pollution in urban areas.


With regard to **greenhouse gases emissions, causing climate change** and directly related to the energy use, directly or indirectly from fossil fuels (from the electricity use to transports), all the efforts should be focused in the reduction of energy consumption and in energy efficiency. These emissions may have a compensation in investments elsewhere in the sector of forests (sinks of carbon dioxide) or reduction in other projects and activities.

The choice of electricity supplier to a sports infrastructure or to a sporting event can be relevant, given that there are several cases in which concerned energy sources are predominantly or exclusively renewable.

The **focus on renewable energies** is relevant and the infrastructures (portable or not) should be equipped with solar thermal collectors for heating of sanitary water and/or for preheating the space (indoor event). Indoor spaces can be equipped with photovoltaic panels for electricity generation; in open-air, for electric power supply, the use of portable low noise gasoline (and not diesel) generators should be preferred.

Replacement of the light bulbs is one of the easiest measures to save energy at home. The change of a halogen bulb by a LED can save up to 90% on consumption.

The installation of a photovoltaic panel can cost less than 500 Euros, a recoverable amount in 6 to 8 years. To take advantage of the new production systems for self-consumption, the infrastructure consumption during the day must be known, since the goal is to avoid consuming from the network when the panel is producing.



LED lamps are the most efficient in the market today and allow the replacement of the halogen lamps. After 25 years and 1000 hours of use per year, a LED lamp, including the costs of purchase and electricity consumed, will cost only 71 euros, while a halogen one represents an expense of 320 euros.

All equipment, when not in use, must be turned off, rather than leave them on stand-by. Daytime use of infrastructures should be preferred whenever possible, in order to avoid high electricity consumption in lighting.

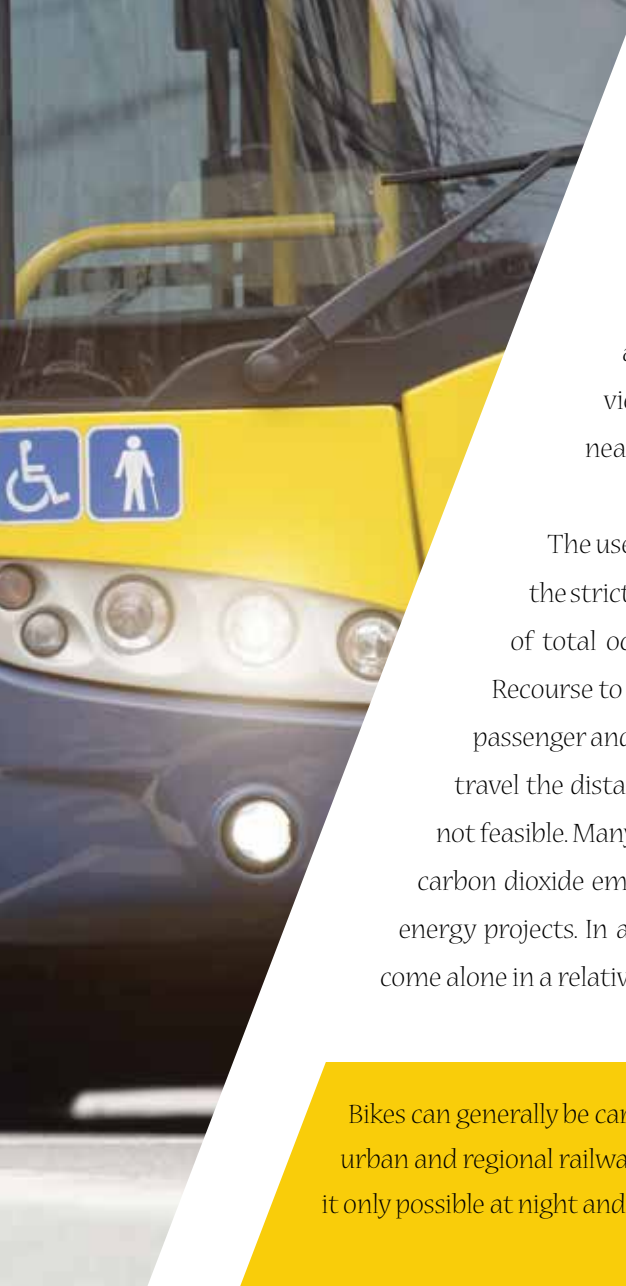
As simple examples to follow, it is suggested that the gym equipment that use electricity should stay off when not used; in small events, it is preferable to use inkjet printers (less energy-consuming); when higher number of prints is required, laser printers are indicated.

Individually, energy can also be saved by interpreting the physiological signals associated with the physical workout, instead of using electronic monitoring devices that always mean energy consumption levels that, in many sporting activities, are expendable.

The **means of transportation associated with the organization, athletes and spectators** are, by far, one of the greatest impacts associated with the management of sports infrastructures and for events. The journeys of athletes and spectators have an adverse effect on the environment by greenhouse gases emissions, air pollution, noise, congestion and parking, among other factors.

As previously mentioned, with regard to greenhouse gases emissions that cause climate change and directly related to the energy use from fossil fuels, transport is the area of greatest weight in sports events. All efforts should be in reduction of energy consumption and energy efficiency. A compensation of these emissions can take place in investments elsewhere in the sector of forests (sinks of carbon dioxide) or reduction in other projects and activities. In addition to the issuance of this type of gas, should also be considered the emission of other pollutants in the air with more direct effects on human health and ecosystems, especially in the case of road transport.

In this context, the **promotion of sustainable mobility** should be one of the aspects that greater care should receive to improve the environment (and also in operational terms, especially in the case of major events). In many cases, it is appropriate to undertake a mobility plan and partnerships with public transport to ensure the greater flow of people with the smallest impacts (e.g. titles of public transportation combined with the ticket to the event).



At larger events, it is necessary to **organize public transport** from public transport centers. In events of more than one day, it is essential to promote accommodation as close as possible of sporting events. You must motivate viewers to use public transport or carpooling, as well as for those who live nearby, **promote the use of bike** as means of transport.

The use of electric vehicles, modern vehicles (and therefore in compliance with the strictest standards in terms of gas emissions and efficiency), the promotion of total occupancy of vehicles, are possibilities for minimizing the impacts. Recourse to train and/or subway, should be a priority for its low emissions per passenger and the enormous carrying capacity. The plane should be limited to travel the distances in excess of 500 kilometers, when the train alternative is not feasible. Many airlines allow, through a small payment, invest in offsetting carbon dioxide emissions associated with the trip, for example, in renewable energy projects. In a way, the emissions from a trip by air are equivalent to come alone in a relatively efficient automobile gasoline or diesel.

Bikes can generally be carried in various public transportation at no cost. In Portugal, that is possible in urban and regional railway CP and Fertagus, and in Metro do Porto at any time. In Lisbon, the Metro makes it only possible at night and on weekends; the alternative is Bike Bus from Carris.



At events in natural areas or through sensitive areas, the **car parking planning is absolutely crucial**, and should occupy concentrated and well-defined areas, with less environmental impact, to avoid the disorderly parking and disturb either the competition or the environment. The same should happen, but more for reasons of congestion, at events in towns or cities.

In daily life, it is important to **encourage travel on foot, or by bike** (especially for distances less than 2 km) or take public transportation to the Sports Centre. There must be, whenever possible, unique parks for bicycles and parking for individual vehicles should be limited.

Either to sports infrastructures, or in sporting events, all the **work of preparation, monitoring and accounting for emissions** is very important, given the dimension reached, in almost all modalities, by the issues of mobility

For distances shorter than 2 km, walking is the cheapest, simplest and cleanest transportation option. Walking every day for at least 30 minutes, fast-paced, strengthens the muscles and bones, helps to improve mental health and reduces the risk of cardiovascular disease.

Did you know that:

- Even with competitive prices, in short distance routes, travel by plane should be avoided and in medium distances train should be preferred: it is estimated that 10% of air travel in Europe could be made by train, which emits at least 2/3 less carbon dioxide.
- A train with four cars can pull off the roads 16 buses, 300 cars or 600 motorcycles. In Lisbon, on 25th. April Bridge, statistics have become real with 19 million car crossings avoided per year, thanks to the train.
- The bike is an ideal means of transport to travel short distances up to 5 km. Being not only a non-polluting vehicle and easy to carry, it also takes up little space: 10 bicycles fit in the space of a car. In addition, it can be transported in some buses, in the boat and in the train.
- Bike lanes, echo-paths and cycle tours are already a reality in some cities. Whether by bike, on skates or on foot, to take advantage of these spaces is a good way of recreation or sport associated with a minimal environmental impact. Learn where you can find them in Portugal in www.ciclovia.pt.
- There are car-sharing networks available via Internet. With colleagues or friends who reside in your area, daily journeys will eventually be less expensive and also less polluting than traveling alone.
- The use of new electric vehicles or with low carbon dioxide emissions is an important contribution to the reduction of greenhouse gases emissions that cause climate change.

Water is one of the relevant aspects in environmental management of a sports infrastructure or in the performance of a sporting event. Water is a fundamental good that must not be wasted, which in many places is scarce, also avoiding a high cost for the organization. The reduction of water consumption in taps is also associated with a reduction of wastewater discharges and energy consumption resulting from the use of hot water.

There are multiple basic recommendations to **reduce the use of water**, the main of which in the area of sport relate to the locker room. The use of highly efficient showers, with a water consumption of less than 7 liters per minute, with faucets that allow an easy temperature control and that turn off automatically. Awareness must be raised among sportsmen for short showers, with a period of running water of no more than 5 minutes, closing the water of the shower during the period of soaping.

Water leakages often pass unnoticed, but they can cause huge expenses. A leaky faucet drip wastes about 46 liters of water per day (about 9 5-liter bottles). To have a leak in a toilet could mean 400 liters per day, the equivalent of 80 of those bottles!

A water leak at home can be very expensive. An effective way to identify its existence is to be attentive to the water counter. For example, before going out for weekend, just register the reading before leaving and then when returning, checking for any changes.



Dual-flush (3 and 6 liters) or an interrupt flush enabler should be chosen. To save water, some objects can also be put inside the cistern (a bottle with water or sand, for example), filling in a volume that, otherwise, would be occupied by water.

The **use of more efficient devices must be promoted** to minimize consumption. It is desirable to use single lever mixer taps, or thermostatic, which also reduce the consumption because they reduce the waste until the water has reached the desired temperature (for elimination of temperature adjustment time and ease of opening and closing). An aerator, pressure reducer (ring or valve) or switching valve can also be installed.

To close the tap while soaping one's hands or brushing one's teeth allows the saving of around 10 liters of water per day. The savings will be even greater through the installation of flow reducers, because they allow to reduce water consumption by 40%.



Flow reducers have very reasonable prices and are easy to apply in faucets and shower. And the best part is that, although the flow is 40% lower, the volume of water looks the same, because some air is added to the water flow from the tap. Easier saving would be impossible!

How long does it take a shower? If you shorten the duration to 5 minutes, water consumption would be reduced up to 80 liters. The savings will be even greater if you store the water while it is expected to warm up, reusing it in the toilet or watering plants.

All **faucets should have a flow reducer** and be prepared to save water, whether with greater opening angle of the handle, by turning off automatically, or because they are activated by sensor. It is desirable to replace a conventional faucet with an average flow of 6 liters per minute for a more economic with 3 liters per minute (common value to existing faucets on the market) with a potential reduction of 50%.

The toilet cisterns must have double unloading; in the case of cisterns with unique unloading, they must be regulated to smaller volume discharges or placing an object inside the tank (for example, a bottle filled with water), so achieving the same goal.

There are more sophisticated solutions, promoting the **reuse of water**, allowing used water to return to the domestic circuit. Not all type of water can be reused. So, you have to take into account the following specific features of the different types of water: rainwater – water collected on the roof; the most common method of collection and conservation of this water is the use of reservoirs; greywaters - these include water from any part of the housing, with the exception of the toilet. This type of water should never be collected and stored.

As to the **swimming pools**, the water filtration process, disinfectant products and the control of other quality characteristics such as pH, hardness and alkalinity is crucial to enable save water and reduce the application of products associated with its maintenance. In many cases there are alternative and effective treatment systems with a lower application of chemicals, ensuring the same the necessary disinfection of the water. Also in the context of indoor air quality, there should be a periodic review of water heating systems and air conditioning for the presence of bacteria such as Legionella.

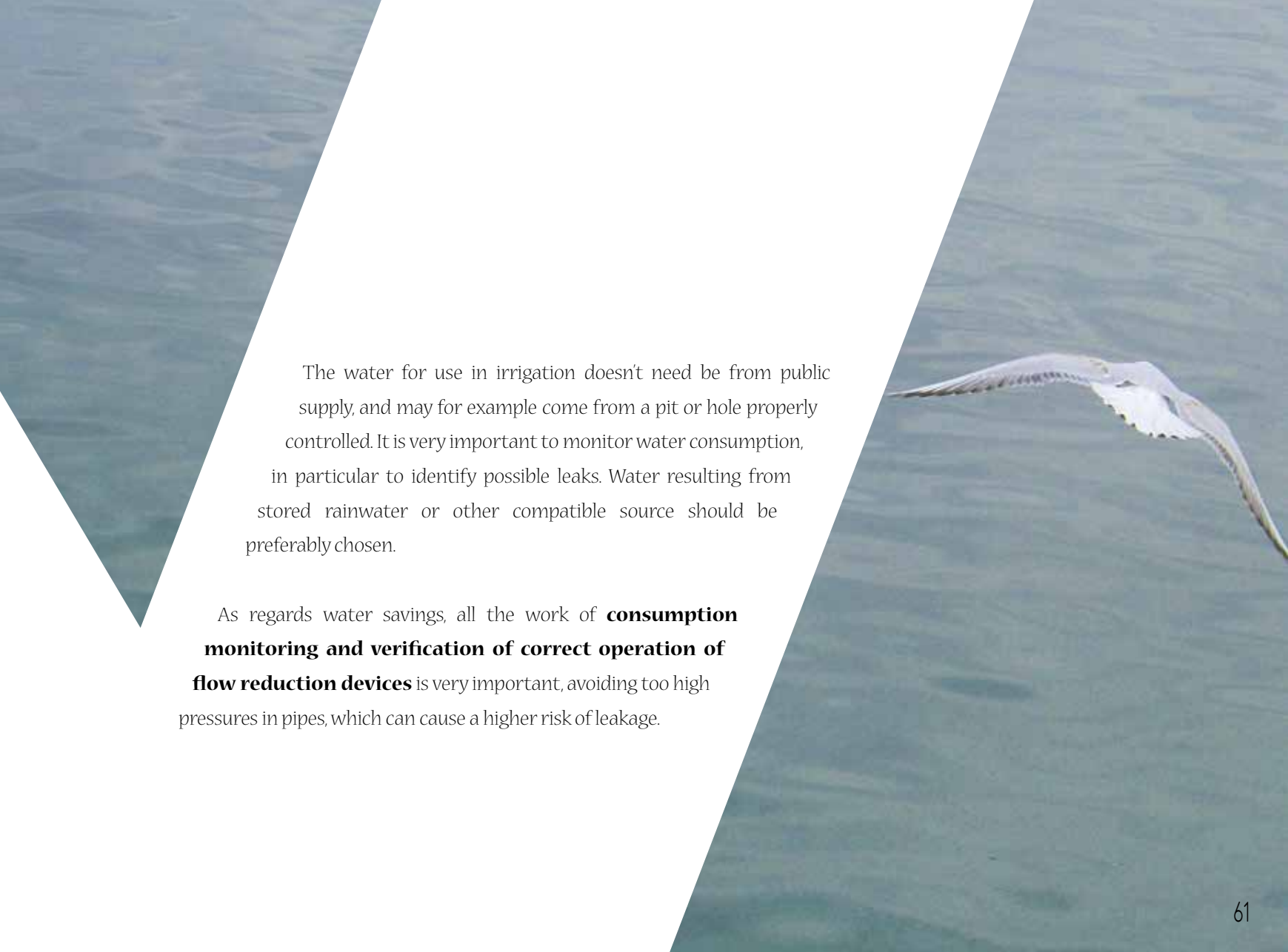
Along with the change of behavior with a view to more rational consumption habits, a great help to reduce water consumption is the choice of devices with water efficiency class A in case a label is attached. In addition to the flushing cisterns, it is possible to find this certification in faucets and showers.



In the case of sports infrastructures with green areas, the **choice of species in a lawn** or in a green area, must be diversified, preferably autochthonous, adapted to the climate, featuring smaller need for water. In the case of watering, it should be made preferably dropwise or dispersal, in colder hours (morning and afternoon), with properly controlled amounts, avoiding water supply when rain is forecast. Watering must be programmed to be on in hours of less heat, in the early morning and the end of the day.

Drip irrigation is a true ally of water savings. In addition to being a great durability system, it allows, whether programmed or manual, to reduce water consumption up to 90% and greatly turn this task easier. Nowadays, very affordable solutions for flower and vegetable gardens can be found in the market.

For the benefit of both plants and water savings, watering must be done in a controlled manner and appropriate to the needs of the season. Ideally, watering should occur in the morning or at night, when there is not so much water evaporation. Plants that don't need direct sunlight can be placed in a cooler area to better retain moisture.



The water for use in irrigation doesn't need be from public supply, and may for example come from a pit or hole properly controlled. It is very important to monitor water consumption, in particular to identify possible leaks. Water resulting from stored rainwater or other compatible source should be preferably chosen.

As regards water savings, all the work of **consumption monitoring and verification of correct operation of flow reduction devices** is very important, avoiding too high pressures in pipes, which can cause a higher risk of leakage.



#MATERIALS

The use of materials is an aspect usually devalued in the construction of sports infrastructures or in the realization of events, but it is, in effect, of great importance in terms of use of resources and avoiding associated environmental impacts for the future.

The **design and planning of a building for sport practice** are crucial for the Ecological Footprint associated with construction, maintenance and decommissioning. Key issues are the location (in particular in terms of accessibility), building materials that may partly result from the recycling of construction and demolition waste (CDW), the isolation, the use of natural light, the use of materials with smaller emissions associated with its generation, to avoid certain materials that present any toxicity (for example, certain paints or interior materials with emission of volatile organic compounds).

Who would have thought that something so banal like painting the house could be more or less eco-friendly? Everything depends on the paints, so we should choose them with the European eco-label. Less hazardous substances and a low content of solvents are the advantages to health and environment.



The construction of sports venues or the promotion of sporting events can be made with **environmental care, greatly reducing the consumption of material resources** – use of tents or supports easy to assemble and dismantle, the choice of materials for buildings whose provenance is next and requiring less energy in the manufacturing, design of infrastructures which may have multiple uses and requiring low maintenance.

The installation of double glazing windows improves the acoustic and thermal insulation of housing, helping to reduce 10% of energy consumption in heating/cooling. 4 and 6 mm glasses and window frames with thermal break should be chosen.


A background image showing a river with reeds and a wooden post. The image is split into two main sections by a white diagonal line. The top-left section is white, and the bottom-right section is a light brownish-grey. The river is in the foreground, and the reeds are in the background. The wooden post is in the foreground on the right side.

#WASTE

There are different categories of waste that should deserve attention and have their rules in terms of collection and final destination. With regard to waste, **it is vital to understand its typology, separate it properly and forward it to the correct destinations.** Waste is classified in relation to its origin (most commonly schools or sporting events, urban waste), but also in relation to its hazard (hazardous and non-hazardous). With regard to the origin, we must consider, for example, medical waste, and in some cases, construction and demolition waste. In a school or a sporting event this type of waste can be generated and it is essential to give it the appropriate destination for treatment and/or recycling. There are also specific types, such as batteries or lamps that in many countries already have a collection system implemented.

The space inside the yellow street recycling bins, used in Portugal for plastic and metal packaging, is largely occupied by air. Bottles and other containers are often deposited with cap, without crushing them first. One good trick is to take the air out and put back the cap to prevent the air to re-inflate the bottle.

What will be the proper destination for compact fluorescent lamps? One thing's for sure: whether intact or broken, they should not go to normal waste. The wiser thing to do is to give them for recycling at a point of sale.



Used batteries must be recycled! As an example, in Portugal there are 16000 collecting points along the whole country near recycling centers, commercial spaces, hospitals, businesses and schools. Environment must be protected from this hazardous waste, with a high potential of contamination of soil and rivers.

The most important principle in waste management is to prioritize action according to the following order:

reduction, reuse and recycling. Any strategy must always be subject to a careful evaluation, and the acquisition of many materials must consider these principles. So there must be a system of selective collection of packaging. The containers shall be placed at strategic locations (inputs, outputs, restoration areas, surroundings of the competition/concentration zones), duly marked, in sufficient number and with the appropriate volume. Next to each collection site there must be a place for dumping of undifferentiated waste. It is essential the **use of simple symbols or words**, possibly in different languages, in order to be clear about the type of materials associated with each container. The containers or the type of deposition may take very different forms, like simple bags, to more complex and creative structures, designed exclusively for the activity,

using preferably the materials with low environmental impact, and preferably allowing a new use later. The use of volunteers to help in the correct separation or waste collection is very important. The packaging, wherever possible, should be compressed before deposited at the collection site.

One of the most critical aspects associated with sport is the need for water, and eventually other drinks, especially for athletes, but also for the spectators. The main objective is to ensure quality, while minimizing the use of packaging or ensuring the most appropriate destination after use, through selective collection and forwarding for recycling. The preferred option **in relation to drinking water, is always the use of tap water**, distributed by means that do not compromise its quality.

In order of decreasing priority, a set of guidelines can be followed and must be adapted accordingly to the nature and extent of the sporting event or facilities where the practice of sport takes place:

- use of deposits/bottles that allow fill cups or mugs reused by each one of the users and that can be distributed at the time of first use;
- distribution/sale of liquid foods in cartons of high capacity;
- avoid use of complex materials (composed of different types of material – plastic, cardboard, aluminum).



Municipal waste separation and subsequent forwarding to a collecting site is crucial to avoid a huge waste of resources and energy. So, don't put it in the dumpster any undifferentiated waste which may have a most environmentally friendly destination.

When purchasing water, beer, soft drinks or wine, deposit-return bottles must be preferred. The reuse of packages spares more resources than recycling. In addition to be cheaper, it doesn't cost that much to deliver it back to the place of purchase.

Traditionally, the **eco points** are the collection of waste paper and cardboard, packaging (plastic, metal, other packaging multimaterial) and glass. In some cases there are unique containers for wastes considered organic (or fermentable), which are then directly sent to treatment processes such as composting or anaerobic digestion (cases of food waste or gardens). In many countries, there are also systems implemented on a national scale and with legal obligations/targets covering lamps, electric and electronic material residues, medicines, batteries and end-of-life vehicles. On the initiative of some business segments, local/regional bodies or non-governmental organizations, there may be more informal selective collection systems for recycling materials such as used cooking oils, coffee capsules, corks, x-rays, toners and cartridges, CD and DVD, and large waste volumes.

Much of the dirt inside closed sports facilities comes from outside. To reduce the entry of dirt, rugs for retention of debris should be installed at every entrance, avoiding the early deterioration of the interior.

The rugs should be arranged as follows: carpet with metal blades, whose function is to retain the larger debris; thick carpet, which retains the particles of average size; and a soft carpet, to retain the smaller particles and water.

During an event it is desirable to **to promote was recycling** using the loudspeaker system, providing information digitally in the form of online applications, make the impression materials (only if necessary) on reused or recycled paper. The distribution of advertising must be careful to keep the enclosure.

Bars and coffee shops are usually present in sports facilities. Among the most favourable measures from an environmental point of view are the efforts towards reducing packaging, providing non-disposable utensils (cups, plates and cutlery), avoiding exaggerated wrapping the food, using the beverages with returnable tare, the use of some products in bulk and the presence of some products in larger packages instead of sachets. The used cooking oil should be sent for recycling and environmentally friendly products should be used when cleaning.

In a sports facility, it is normal and desirable the existence of a location for medical support, being dedicated to provide first aid or medical attention and nursing care. One of the main environmental issues concern the **correct routing and separation of generated waste**. All packaging must be delivered in a pharmacy. Most of the waste is to be considered urban waste. However, residues with blood are considered as presenting biological risk and therefore classified as hazardous. Such happens also with another group, the specific clinical waste, which encompasses the piercing and cutting materials. Each one of the referred groups must be collected separately and forwarded to a destination licensed for treating them.

Still regarding waste, it is very important all the planning, follow-up and monitoring work, allowing, at the end, to assess the quantities produced and promote measures of further reduction, reuse and recycling.

Just one liter of oil is enough to pollute about 1 million liters of water. A strong argument for routing correctly our used cooking oil. In many countries there are collection bins in the street, in businesses or in recycling centers.



#BIODIVERSITY

Sports activities and sporting events can lead to **conflicts with nature conservation objectives and safeguarding of the landscape**. Many sports require substantial areas of territory to the sporting activity itself, in addition to areas intended for parking, accommodation and complementary infrastructure. The occupation of land, damage to vegetation and disturbance of ecosystems should be heavily weighted to avoid conflicts. In some cases the preservation of nature may impose the impossibility of carrying out the activity, while in other cases mitigation measures will suffice. Restoration initiatives may also be considered.

The most important aspect in relation with nature and biodiversity, is **planning the event** in order to respect the natural spaces in question (for example, without crossing dunes or other sensitive ecosystems outside of established paths including risk areas as cliffs; avoid excessive noise and disturbance; evaluate the season concerned so as to interfere as little as possible with the present fauna).

In Portuguese mainland, the areas protected and/or classified under European legislation relating to the conservation of nature occupy 22% of the territory.






It must be **identified if the area where the event is intended to take place** is a natural area within the National Network of Protected Areas (RNAP), included in the Natura 2000 Network or classified under international commitments assumed by the State.

It is essential to **check the existing regulations** in Protected Areas, such as Parks and Natural Reserves, where in some cases there is a nature sports card with rules and guidelines for the different sporting modalities, containing provisions on limitations to fulfill in terms of use and pointing out times of the year when certain activities have restrictions. In other cases, there are orientations in the planning layout of respective Protected Areas, published as local or national regulation.

In general, **in sensitive areas for natural, historical or cultural reasons**, large concentrations of people in vulnerable places or vegetation cuts, occupation of productive soil areas in agricultural terms and in areas near sources of water supply **should be avoided**. At the end of any event, a thorough but not intrusive cleaning must be undertaken in the space, seeking to leave it as found. As a way of compensation for some impact caused, afforestation or reforestation actions in situ or in nearby areas can be developed.



Lastly, and in this area related to nature conservation, it is important to highlight the existence in some countries such as Portugal, of a **National Program of Nature Tourism** that seeks to ensure a correct enjoyment by tourists of important areas in terms of conservation of nature, and may involve many activities with a sports component, many times under an informal context. According to the actual legal framework in Portugal, tourist resorts and tourist entertainment activities, to be considered as nature tourism, have to be recognized by National proper institutions.

33% of the continental Portuguese territory is occupied by forest: raw material sources, biodiversity and local shelters of leisure with very important role in carbon sequestration. So preserve them and denounce threats.

A good way to increase biodiversity of our gardens and even balconies includes placing nest boxes on trees, which we ourselves can produce by reusing lumber, logs and other material. Attracting more species of birds, we also have some extra help to let our garden free of pests.

Sports should be taken out comprehensively, involving an exercise that can take many different forms, as well as feelings of fun and pleasure, in an orderly manner in a club or not, individually or in group, in an enclosed space or outdoor. Sporting activities have a social and cultural dimension that is very relevant and that is key to a more sustainable society. Sport allows the development of a whole series of important interconnections between who practices it and a set of skills such as communication, respect, the formation of an individual and collective identity, not just in the sense of community but also with the surrounding environment, and hence its importance for a more harmonious development. The role of technology and social networking helps the promotion of activities.

In the field of social inclusion, sport has been driving a set of initiatives that have **allowed to unite and establish internal and external relationships in local and regional communities**, immigrants, youth, women and people with reduced mobility or with disabilities of different nature, among others, depending on the country and region concerned. Sport has also served to boost a set of causes, motivated by the action of individuals or companies that have allowed to create spaces for participation, education, within the framework of a broader citizenship and solidarity.

Considering the dimensions of sustainable development, good environmental practices should be integrated in a number of allied actions and a social inclusion strategy that should be considered to boost the various sporting events, as well as an increased use of sports infrastructures.

To configure a perspective of a more sustainable future, in addition to a whole suite of indicators relating to the use and consumption of resources, ecosystems, health and education levels, equity, **happiness is also a key element of evaluation**. No matter how many numbers we can compile translating the implementation of good environmental practices, and more broadly, in terms of sustainability, the most important thing is to **be able to assume a lifestyle and values that ensure the survival of the planet**. In this context, sport plays a crucial role, motivating to a set of principles that seek to guarantee individual and collective satisfaction, in particular through better health, wellbeing, the incorporation of a spirit of overcoming but of respect towards others, creating moments of pleasure and happiness, many of them in close contact with nature.

Having a healthy lifestyle goes through framing sports activity as something that is part of the common habits of each individual and society, in the same way that the incorporation of a set of attitudes and environmental practices should be an effortless routine but aware of a contribution for the sake of future generations and the planet as a whole.

In this context, one should encourage and promote the dynamism of a set of local relationships, where the quality of life, justice, social integration and environmental protection, are valued. As so, the quality overcomes the quantity, favoring materials, food products and other goods





that stimulate the safeguarding of health in communion with the environment, avoiding the introduction of elements likely to create or exacerbate imbalances at individual and collective scales.

From **city planning** with the presence of green areas, circuits, maintenance or other recreational areas that allow activities as simple as walking or cycling, to the usufruct of

more remote rural and natural areas, with ample spaces and landscaped stimulants, taking advantage of one of the important services of ecosystems, there is a whole series of opportunities that we should proceed for a healthy and sustainable life.

In Portugal, about 60% of the population lives with noise levels above the values recommended by the World Health Organization, which has already considered that situation one of the greatest environmental problems throughout the European Union and the second in terms of health impacts, immediately after atmospheric pollution .





NATURAL AND CONSTRUCTED SPACES: DIVERSIFIED OPPORTUNITIES FOR PHYSICAL ACTIVITY

Sport interacts with the environment through different dimensions: a territorial dimension related to the temporary or permanent occupation of the territory, a material dimension associated with the use of resources, a behavioral dimension, depending on the procedures taken by the various players, and even a dimension covering the entire set of services and terms particularly with event management or infrastructure.

At national and international scale there are numerous sports federations and/or organizations and institutions which give emphasis to promoting sustainability in sport. At the same time, the creation of spaces or bounded regions with specific characteristics to certain modalities is a very relevant form of the promotion, as is the case in Portugal with the Ericeira World Surfing Reserve.



Natural spaces, or spaces with more rural characteristics, as opposed to urban centers, can allow a set of varied physical activities, since the achievement of individual or group hikes, enjoying the scenery in a perspective of leisure and recreation or using an walking/cycling lane (associated with, for example, a former railway route), to the more especial area of adventure in nature. Natural conditions, by strengthening the sport of nature, lead to desirable promoting a balance of each individual with a less disturbed environment, being a means of promoting a greater care for the environment or of enhancing activities related to tourism or environmental education. In places such as rivers, lakes and sea, involving sports such as canoeing, the land areas with different typologies, boosting activities such as orientation or mountaineering, or still in the air, with practice jumps of parachute or paragliding flight, there's a whole offer which sets, in many cases, examples of adventure sports. In different contexts, from individual to social, many physical activities become excellent opportunities of environmental valuation.

The urban space, if properly designed or rehabilitated, is a great opportunity to combine physical activity with sustainable development objectives, reducing the ecological footprint of villages and towns, and



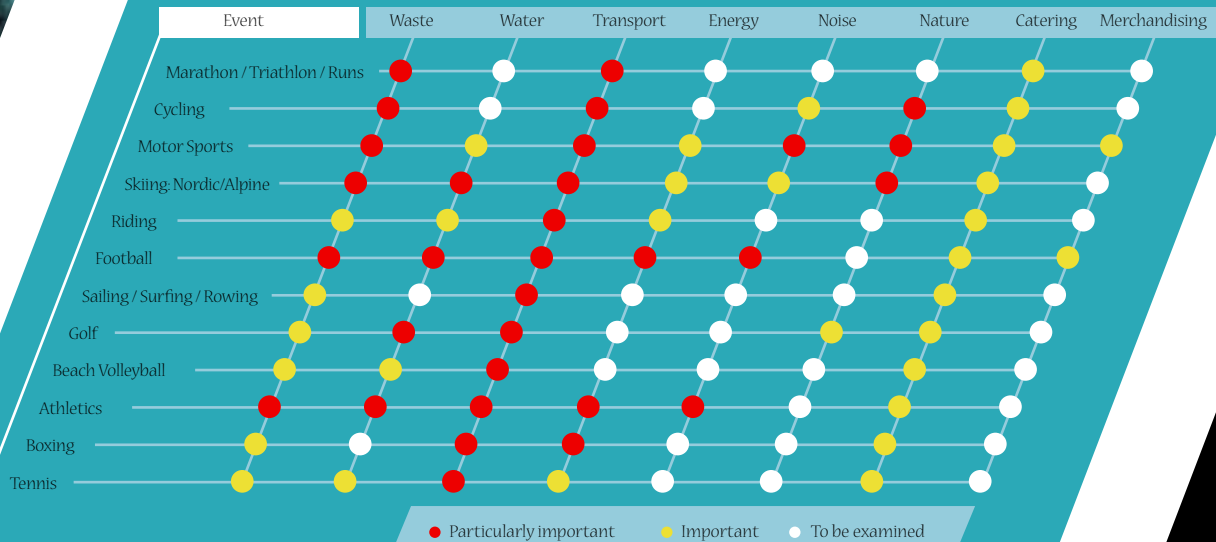
improving the quality of life and of various environmental indicators in particular. Moreover, the territorial planning can be a source of education and training that goes beyond the experience of the residents, being a source of examples to follow. The planning can, in the long run, be one of the most decisive strategies for the promotion of different forms of sport, combined with features for sustainable development, and where the conciliation of objectives should almost go unnoticed. With regard to soft mobility, stimulating pedestrian circulation, rollerblading or cycle, it reduces pollution caused by the use of the individual road transport, noise, resource use, and promotes the health of those who use modes of travel also more environmentally friendly. The design of urban centers with walking or cycling routes (bike lanes) and transport networks that facilitate intermodality is crucial to healthier cities and villages. Other aspects of the urban space, from the presence of green spaces to open areas like broads and squares, can be potentiating factors of an informal sports activity, properly integrated into the population, with a relevant social and community role. The creation of simulated environments in urban context (a skateboard park, for example) is one of the possibilities that may be part of a wider vision of the integration of adventure sports in an urban center.


AN ENVIRONMENTAL VISION FOR DIFFERENT SPORTS

Each one of the different sports presents specific environmental impacts that must be minimized, both in relation to the construction and maintenance of infrastructures and to the organization of events.

The size of the event and the number of participants and spectators are one of the main conditions of the impacts, from a little local meeting with a few tens involved, to global events such as the Olympic Games or World Championships.

Impacts associated with different sports (BMU 2007)






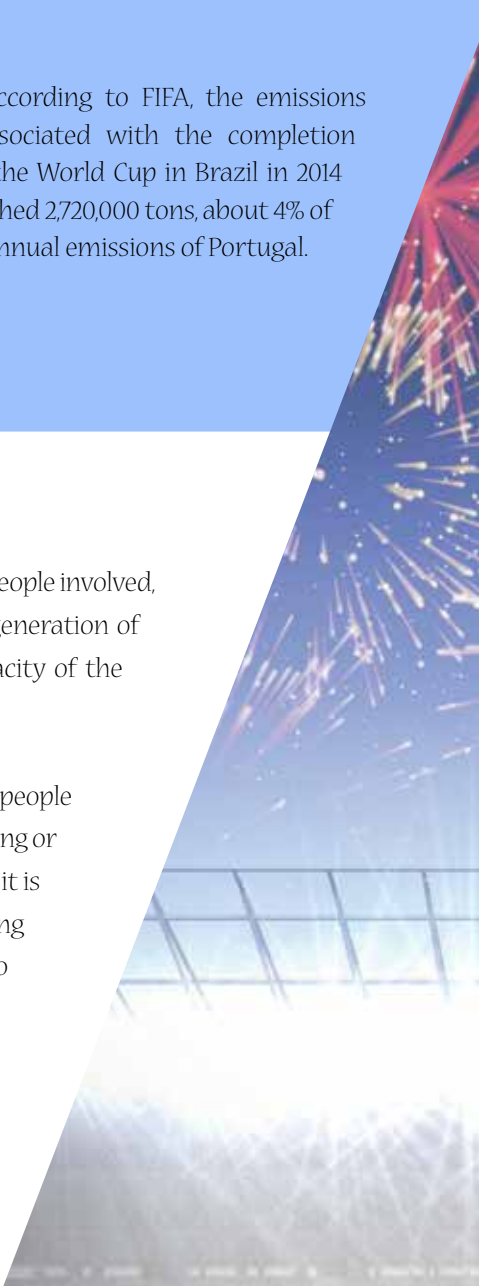
The lighting of a football game in a stadium consumes the equivalent of 10000 lamps lit during 4 hours. Promotion of games by day or using LED lighting can avoid this expense.

The nature of the sport is also another condition – if it is practiced indoors or in open spaces and sometimes with particular requirements in terms of infrastructure and logistics.

When evaluating the impacts associated with each one of the modalities, an enormous specificity can be found and deserves to be addressed on a case by case basis, also taking into account the location that fits the activity. Moreover, both sporting activity can influence the environment as vice versa – taking as an example the summer Olympic Games in Beijing in 2008, on the one hand, the use of resources and emissions associated with the transport of athletes and spectators was very significant, on the other hand, air pollution was a factor of complicated management to guarantee the healthiest environment for the events. In London, in 2012, the Olympics were considered to be those in which major environmental care were taken, offering an opportunity to show the ability of sport to be able to provide more sustainable measures and structurally relevant to the city itself.




An 18-hole golf course consumes 200 to 250 million liters of water per year; in several cases, treated wastewater is already reused.



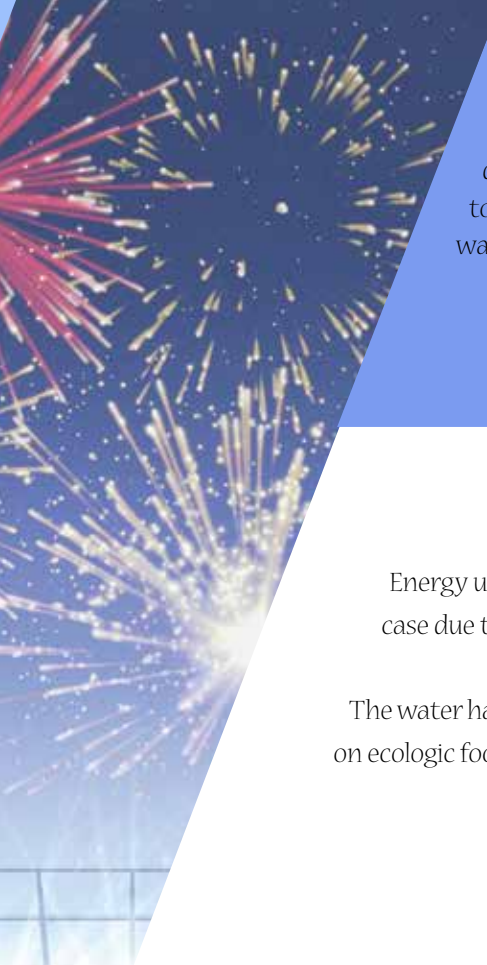
According to FIFA, the emissions associated with the completion of the World Cup in Brazil in 2014 reached 2,720,000 tons, about 4% of the annual emissions of Portugal.

One of the main impacts, common to all modalities, depending on the number of people involved, is due to the use of transport. The second area with greater expression, is the generation of waste, where a lot depends also on the behavior of the spectators and the capacity of the organization to collect, separate and clean.

Noise is obviously associated with all motor sports, but also with the presence of a lot of people in a stadium environment, such is the case of football or athletics. In field modalities of cycling or in motocross, the impact on the landscape and nature must be considered. In road cycling, it is essential to consider the impact that the disorderly car parking and the presence of people along the road may have in more remote areas or sensitive from the natural point of view, where also the waste can leave its mark on the landscape.

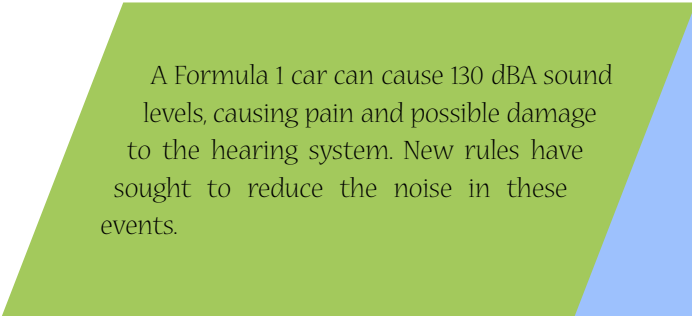


In London Olympics, 90% of the materials were obtained from the reuse of demolition waste, there was no waste to landfill and, in events, 30 to 40% less water than normal were used.

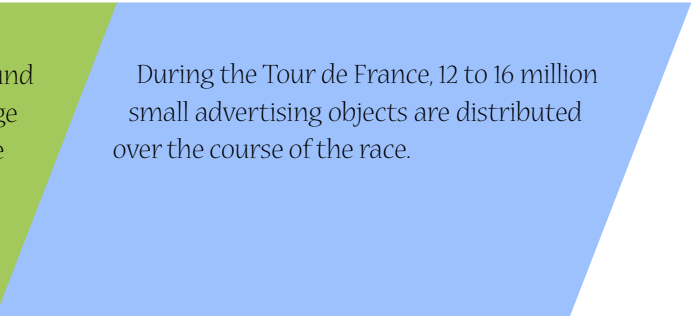


Energy use is very considerable in large stadiums or in enclosed spaces due to lighting, and in the latter case due to air-conditioning needs.

The water has a huge weight in infrastructures like a golf course, while advertising objects weigh mainly on ecologic footprint in motor sports and football.



A Formula 1 car can cause 130 dBA sound levels, causing pain and possible damage to the hearing system. New rules have sought to reduce the noise in these events.



During the Tour de France, 12 to 16 million small advertising objects are distributed over the course of the race.

A photograph of a swimmer in a pool, captured from the side, showing their torso and arms as they move through the water. The water is a vibrant blue, and there are lane lines visible. The swimmer's skin is wet and glistening. The image is partially obscured by a white diagonal shape that contains the text.

INDICATORS FOR A SPORTING EVENT

The quantification of any sporting event is very important because it allows us to have more concrete information to diagnose the impact, compare events and evaluate improvements. In the context of sustainable development, not only the environmental aspect, but also the economic and social components, should be evaluated.

A photograph of a person in a white kayak on blue water, positioned on the left side of the page. The kayak is partially visible, and the person's arm is extended. The water is a vibrant blue, and the background is a white diagonal shape that frames the text.

#ENVIRONMENT

- Calculation of Ecological Footprint of the event (calculation can be performed with the help of experts or using, for some variables, existing simulators in various places on the internet)
- Calculation of the carbon footprint of the event (total calculations can be made with the help of experts or using some variables existing simulators in various sites on the internet)
- Carbon emissions associated, total or partial - for example, integrating only the mobility component or associated with energy consumption during the event (simplified alternative compared to the carbon footprint)
 - Average distance traveled by each participant/viewer to get to the event
 - Proportion of participants and spectators who used each means of transport
 - Total energy consumed by the event (and also per participant/viewer)
 - Total water consumed by the event (and also per participant/viewer)
 - Total waste produced by the event (and also per participant/viewer)
 - Total waste sent for recycling (and also per participant/viewer)

#ECONOMY

- Number of participants and spectators
- Costs of food and lodging
- Total investment in the event
- Expense per participant/viewer
- Distribution of revenues and costs
- Investment associated with the local community
- Number of working hours involved (paid)






#SOCIETY

- Percentage of participants/viewers per age group
- Ratio of participants/spectators regarding the gender
- Qualitative assessment of interest by participants/viewers/
local community
- Number of hours of volunteer work

CONCLUSION

The relationship between sport and the promotion of sustainable development in its different aspects, environmental, social, economic and also institutional is complex and sometimes contradictory. The nature of sports activity, the infrastructure necessary for its practice, the scale of realization (from local to world), the level of mobilization of the public, and all environmental care considered, all of these elements condition a result that can range from very positive to very negative. From small to mega events such as the Olympic Games, the preparation, the operation and even the work subsequent to the event itself, are crucial in the success of the integration of ethical and environmental values in sport. The growing membership of the population to various sporting activities, as amateurs or professionals, with particular attention to the younger population, makes it imperative to discuss a set of ideas and guidelines for the involvement of the athletes, the public, organizations and businesses. This allows to frame and promote sporting activities with a philosophy and an ethic respectful of different values like the ones stated in Portugal by the National Plan for Ethics in Sports, complemented by an environmental sustainability dimension.

On the one hand sport can involve the population in a better interaction with nature, improving their health, the practice of sports activities can also affect the environment. For example, sporting events can have significant impacts on the use of natural resources, waste generation and loss of biodiversity. On the other hand, the environment itself can also affect the sport, given that environmental conditions can compromise sport activities and the performance of the athletes. For example, the warmer climate conditions in Europe in 2007 have affected the practice of winter sports. The lack of a healthy environment can affect not only professional athletes, but can also harm the motivation of the general population. Water pollution, air pollution, noise, loss of habitats, toxic waste, traffic emissions, indoor air quality and climate change, are among the threats to the safe and enjoyable practice of sport.



The promotion of a more sustainable development associated with sports activities can be reached through an environmentally correct management, able to incorporate, among other aspects, the environmental criteria in public procurement, reducing greenhouse gases emissions, as well as the collection and appropriate destination of waste. The structures and organizations responsible for events can also take advantages, like improving their credibility on the environment, as well as the economic benefits associated with a more rational use of natural resources.

The passion that the sport generates makes it capable of spreading positive social and environmental values. Sporting events should be considered not only as an economic opportunity but also as a possibility of dissemination of cultural, social and environmental values, in order to generate sustainable development.

It matters not only WHAT you do, but also HOW to do it and WITH WHOM and the EXAMPLE of our actions

(AISTS, 2014)

In general, there is a set of recommendations and stages which is important to be respected when assessing environmental impact, even simplified, of any sporting event: the prior phase, which may involve the work of several years of demolition, decontamination and construction of new infrastructures; the stage of completion of the event, and even the phase after event, which corresponds to the site maintenance for future uses or to the cleaning and/or conversion of the area. The specific features of each sport and the type of use are crucial in the approach to develop. In any of the stages is important to establish quantifiable objectives and prior a post-evaluation of the goals achieved.

In a sporting event, a holistic approach of lifecycle, combined with an analysis of opportunities and threats, can help establish a script where the environmental aspect is a fundamental element of success.

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Other complementary elements

Some internet sites can be an excellent resource, in particular www.topten.eu and www.footprintcalculator.org.

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