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THE ENVIRONMENTAL IMPACT OF SPORTS
ACTIVITIES. GOOD PRACTICES FOR SUSTAINABILITY:
THE CASE OF GOLF

Sustainability guidelines for sports activities. – Today sports constitute a structural element of the society, since it involves a phenomenon of many people, and it carries out a significant growing role in the pursuit of the objectives of sustainable development. Protection of the environment, resilience of the cities, green economy, promotion of peace, tolerance, equality and economic growth represent the important challenges to be faced in the organization of the events, in the construction and management of the plants and the sensibility of the citizens on the virtuous alliance between sports and environment.

Acknowledging, therefore, the necessity to construct a universal route of sustainable development, above all the economically advanced Countries have shown a great interest in this issue, by indicating in various documents: the ethical outline to support the traditional bases of sports in this contemporary society (*European Code of Sports Ethics*, 1992); the urgency to update the physical sports activities to the limited resources of the planet and to practise them respecting nature and environment (*European Charter of Sport*, 1992, updated in 2001); the general lines to be followed for the construction of the plants and organization of the sports events (*Agenda 21 International Olympic Committee*, 1999); the implications that sports can have on all European politics (*The White Book of Sports*, 2007); the potential of sports as an “important stimulator” for peace, education, social inclusion and a healthy life style (*Declaration of Bangkok on Physical Activities for Global Health and Sustainable Development*, 2016); the inclusion of sports in the aims of sustainable development in the *Global Agenda for Sustainable Development* (Agenda 2030) of the U.N. (2015) (*Piano Kazan*, 2017).

Furthermore, it must be specified that in the *Olympic Agenda 2020*¹ the strategic roadmap for the future of olympic movement, the IOC (International Olympic Committee) has drawn up a Sustainability Strategy, that includes 18 objectives and it is articulated in five principal areas: infrastructures and natural sites; supply and management of resources; mobility; workforce; climate².

In other words, modifying sports activities to environment sustainability standards means to protect the values of nature and the biodiversity both in the planning and construction of the plants and in the organization of the sports events, bearing in mind the territorial context where they are being located and contributing to the use of models of circular economics and the spreading of ecological practices. We need only to think of the initiatives undertaken over the last few years for the Marathon (New York, London, Milan) or the Olympic Games: use of recycled material for branding, the sign posting and the medals; the introduction of 100% recycled water bottles; recycled paper for all the advertisements; the great increase of points of collection of waste along the races and competition routes; the encouragement of the use of public transport or car sharing; the planting of trees to compensate more production of CO²; removal of architectural barriers and digitation of all processes. Also, the large sports plants, like stadiums, are making great efforts to improve the serious problems that they generate on the environment³. The construction of structures equipped with solar thermal systems, photovoltaic panels, irrigation systems with recovered rainwater and sophisticated air-conditioned plants; creation of green areas; the individuation of multi sectorial use of

¹ In March 2021 the “Agenda Olympic 2020+5” was proposed, it is a new programmatic document, which consists of five tendencies (solidarity; digitation; sustainability; credibility; economic and financial resilience) and 15 recommendations which derived from the pandemic crisis.

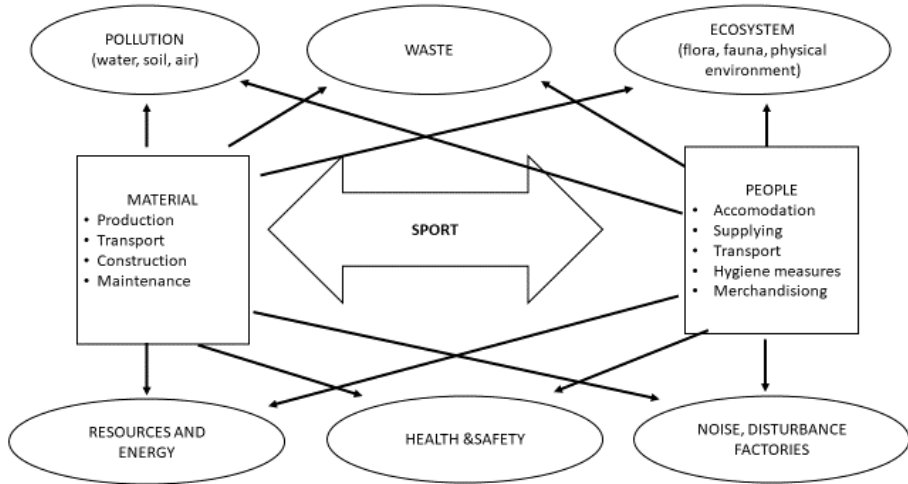
² For this purpose, the Committee has allocated for the next Olympic Games in 2024 (Paris) a substantial economic contribution to create an eco-compatible event: 95% of the infrastructures that will be used already exist; 80% of the sites will be in a radius of 10 km from the olympic village, with a great reduction of movement; a total ban on car circulation and there will be no parking areas for the spectators, who will be able to use only ecological vehicles (hybrid or hydrogen vehicles for competition officials, clean buses, undergrounds or trains).

³ Interesting are the cases of the stadiums: Turin (*Allianz Stadium*), Amsterdam (*John Cruiff Arena*), Taiwan (*Kaohsiung*), Qatar (*Ras Abound Stadium*).

the structures represent some solutions to avoid or limit the emission of CO², noise pollution and to contain the production of waste and energy consumption (Furrer, 2002; Sorrentini, 2020).

In actual fact, in Italy a real regulatory body for sustainability in sports does not exist, so initiatives take place via private or public agreements to adopt effective solutions. For example, recently the Ministry for Environment and Land and Sea Protection (MATTM), the autonomous Region of Valle d'Aosta, the Council of Courmayeur and some of the organization associations of sports events have undersigned the *International Paper for sustainable Sports Events* (2019), with which the signatories intend to ensure temporary events ecologically sustainable, above all outdoor ones, by adopting an operative strategy aimed at contrasting the progressive environmental deterioration and impoverishment and by increasing the positive effects of the new practices introduced.

It is clear that the sports sector has a quantifiable and significant economic and social value, with a potential to stimulate wealth, work, as well as a better life style, which are useful to reduce the pressure on health expenses in the public sector. According to recent studies, this represents 2.12% of the GDP of the EU and the related employment is 5,67 million people (2.72% EU employment) (Cannavò, 2016). According to more recent data, in 2017 in Europe more than 40% of the population practised physical exercises or sports every week, particularly in Central Northern Countries, whereas there was less propensity in Eastern European countries and the Mediterranean area, including Italy which distinguishes itself negatively for sports and other forms of physical activities both for participation and the number of spectators at sports events (Consiglio dell'UE, 2018). Of course, also this sector has received repercussions due to the virus COVID 19 pandemic, which imposed the cancelling and postponement of all the programmed events, with serious economic effects, amounting to 60 billion euros in our country, which corresponds to 3.8% GDP (Giuntarelli, 2020) (fig. 1).

Fig. 1 – *Systemic analysis of an event*

Source: UISP Emilia-Romagna, 2012

Sports and conservation of Biodiversity. A sustainable relationship? – On the basis of the considerations discussed so far, it appears evident that the industry of sports cannot be separated from a sensibility also in the confrontations of the natural and cultural capital, which the biodiversity⁴, with its eco-systemic services⁵ that derive from it, represents an essential component. In a recent guide, the IUCN (2018) declared that sports activities, even though nature and a healthy environment are necessary, they can cause according to the sport and the location (urban or protected areas) some negative impacts, like excessive exploitation of natural resources; modification to the soil for the permanent and/or temporary construction of sports structures and support ones⁶; the

⁴ Biological diversity or Biodiversity means the variability among all living organisms, including those underground, in the air, aquatic, land and marine ecosystems and the ecological complexes they are part of; this includes genetic diversity of species and ecosystem.

⁵ The eco-systemic services are “the multiple benefits provided by the ecosystems to human beings” and they can be distinguished in four categories: life support (eg: formation of soil), food supply, regulation (eg: climate regulation), culture (eg: aesthetic or religious) (MATTM, 2010).

⁶ For example, the building of access roads, electric lines, parking areas, seating, public hygiene facilities, fences, commercial structures, accommodation facilities etc.

production of a large amount of waste, as well as noise and bright light pollution generated by the presence of the athletes, spectators and media; the introduction of invasive species in the habitat unconnected with them; the use of large quantities of chemical fertilizers and pesticides; the alteration, loss and fragmentation of the natural habitats; the interference of wild animals, with possible transformations of their way of eating and/or of their reproduction. Furthermore, not to mention the damage caused by sport hunting in particular in parks and natural African reserves (IUCN, 2016), as well as the impact on the vegetation biodiversity in the Swiss Alps where they enlarge and open the ski tracks and the artificial snow plants (Wipf *et al.*, 2005).

On the contrary, events and sports structures can also constitute important catalyzers that conserve the biodiversity and at the same time promote and sustain the efforts to improve it. In particular, it is worth mentioning some possible initiatives to reduce the impacts: improvement of the natural urban habitats by restoring degraded sites, building “green” roofs and walls, connecting the fragmented habitats and installing artificial habitats for wild fauna; collection of funds for the management of protected areas, by organizing low impact events, like running or mountain bike riding; raising awareness of public opinion of biodiversity by means of the use of logos, organization of public exhibitions and educational programmes; diffusion of knowledge and available data, via sharing among the environment organizations and research institutes of biodiversity inventories and basic information that could be requested for the construction of the plants; execution of projects drawn up to compensate the carbon footprint generated from sites and events (IUCN, 2018).

This means that both for the building of a structure (the creation, selection of the site, planning and construction, mounting, dismantling) and for the organization of an event an adequate management is essential, a lack of this could generate many risks: financial ones (little financing etc.), regulations (processes, licenses, fines etc.), operative (health impairment for athletes, decrease of events and plants due to limited appeal) and reputation (difficulty in obtaining sponsors and negative perception of the media and the civil society of the events or sports practice). Vice versa, embarking on prompt and effective actions

to reduce negative consequences⁷ and to maximize the opportunity of conservation of the biodiversity, it is possible to access to the project financing and the environment's approval and social consent for the organization of events; to attain the city and region's acknowledgement as a leader in the procedure of the sector; to attract willing sponsors to promote the sustainability of the products and/or to associate their image to the environment and biodiversity; to achieve the SDGs (Sustainable Development Goals) – in particular 14 (Life under Water) and 15 (Life on Land) – and those of the Biodiversity Convention.

Golf and sustainability: a possible combination. – This analysis has assumed a particularly important meaning for Golf, that has great potential to positively contribute towards sustainable development across emerging and established markets.

However, the creation of Golf Clubs and their maintenance cause considerable effects on the environment, which have above all in the past generated a lot of criticism. In fact, the maintenance of the green of the golf courses involves the excessive use of technical chemical – mechanical means (pesticides, fertilizers etc.) – used in different types and quantities for the various areas of the course (green, fairway, tee and rough)⁸ – that can cause contamination of superficial water and the

⁷ To manage biodiversity efficiently, the IUCN requests to respect the “Mitigation Hierarchy”, based on the principles of precaution, prevention and generation of ecological and nature values. This is to prevent the impacts from the source, considering all the possible alternatives, including the non-realization of the work (“zero option”) and then, ascertained the necessity of the initiative, technical solutions are adopted that minimize and lessen environmental effects, by means of the restoration and ecological compensation (Lipu, 2013; The Biodiversity Consulting, 2015; IUCN, 2020).

⁸ The main parts of the golf course are: *Tee*, that is the starting pitch of each hole (it also indicates the plastic, wooden or sand support on which the golf ball is placed for the first shot to each hole); *Fairway*, the turf well cut between the starting tee and the green of the hole: the grass of the Fairway is cut very carefully, to guarantee a easy game for the player; *Green*, arrival pitch in which the hole is positioned, is indicated by a flag; this surface of the course is the most taken care of and often has slight slopes to make it more difficult to hit the ball into the hole; *Rough* is an area situated on the sides of the fairway where the grass is rather overgrown and longer than the fairway grass, so as to make it more difficult to get the ball into the hole.

Furthermore, along the routes there are the *Bunkers*, that is holes of different width and depth dug out in the soil and which are filled with very fine sand. These obstacles are used by the golf course designers to penalize inaccurate shots. The bunkers located on

underground water table, negatively alter and affect the local flora and fauna, which reduces the vegetation diversity and the opportunity of shelter, nutrition and the reproduction of the animals. Another crucial point is the consumption of water resources, that to maintain an adequate growth of the vegetation in the areas where golf is played, is very high and corresponds to the amount that is consumed in one day in a town of 8,000 inhabitants, so much so there is a competition with alternative uses and the salinization of drinking water, when drilling is carried out to construct wells. Even the soil, besides being taken away from agricultural use or other productive activities, often the resource of livelihood for the local communities, and in some cases subject to physical–chemical transformation to improve the turf and to shape the golf route, for example with excavation operations of the construction of dunes, banks, small lakes, which cause hydrological complications. Finally, there are the atmospheric and acoustic problems respectively caused by the loss of nitrogen due to the fertilization and the increase of traffic, especially when there are competitions and manifestations (Bizzarri, 2006; Mercatanti, 2017)⁹.

On the other hand, a Golf Club can compete to protect the environment by maintaining the biological diversity (lakes and humid areas, alternation of tree and bush areas with grass zones), re-establishment of local species, wildlife refuges so as to become a real naturalistic oasis. As regards fertilizers and pesticide, even if it is not possible to generalize, it must be noted that they have been notably reduced, since the modest percentage of the areas treated (from 2% to 20% maximum of the whole surface) and the availability of the numerous and effective alternative techniques for the prevention of the principal adversities of the turf (agronomic interventions, selection of resistant essences etc.). Also, the management of the water becomes more efficient with the introduction of variety and the species less and less fastidious (for some macrotherms, like weeds, the reduction goes up

the side of the fair way (cross bunker) are usually less deep than those placed to defend the green (deep bunker).

⁹ It should also be highlighted that the core of golf balls contains zinc acrylate which is toxic to many organisms. For example, in marine environments, if left on the sea bed, golf balls deteriorate and their rubber band-like cores. Fish, seabirds and marine mammals can take the rubber band strands for sea grass and eat them which make them feel full and as a consequence they stop eating and starve to death.

to 50%), from the rain water collection and the use of waste water from the purification plants. Finally, as regards the potential conflicts between golf and other activities, it must be noted that very often these plants are situated in degraded areas (former agricultural areas, landfills, caves) or regeneration of the territory and landscape¹⁰ (Caggiati, Bazzani, 2008).

In other words, golf is a sports-recreational activity that establishes stronger relations with the territory, not only from the environment side for the consequences on the ecosystems, but also from the economic and landscape level, both for the changes induced in terms of added benefits, employment etc., and for the impact on aesthetic, historical and cultural values produced by the presence of the plants.

The diffusion of golf goes back to the middle of the 19th century in Great Britain, whereas in Italy it became popular at the beginning of the 20th century and since then its popularity is growing more and more. In fact, it is a sport that is good for one's health and the aesthetic care of the body, it does not require an exceptional athletic preparation, but a good capacity of concentration, it consents social relations, although it is an individual game, and it has the great advantage of being practiced in splendid natural areas (Caggiati *et al.*, 1999). Today there are 90,229 registered players and 368 golf courses divided into 232 courses and 154 practice courses¹¹ which are from a technical point of view of an excellent level, of therefore capable of satisfying the needs of the members and foreigners who choose Italy for their touristic and golf

¹⁰ An example is the golf course for the Olympic Games in Rio de Janeiro in 2016, where the change of destination for sports of an unused quarry in the area of Barra da Tijuca determined an increase of 167% of the vegetation coverage and an increase of the biodiversity, with a passing of 118 living species before the project of 263 after the project and the planting of 15,000 local plants. Now, the land will be actively managed for diverse nature conservation, local community recreation, education and sports development by a non-profit sports body in collaboration with other local stakeholders, and guided by a robust environmental plan (IUCN, 2018).

¹¹ The plants are divided according to their dimension in: practice courses, that is training structures or introductory promotional routes (in 2019 in Italy there are 110); promotional courses, that is small dimension structures with at least three holes, the cost which is low both for the construction and management (44); certificated routes, that require larger dimensions and they are those traditionally used for competitive activity of most of the competitions (232).

holidays and suitable to host big international events, like Ryder Cup, which will be held in Rome, in 2022¹².

Building on earlier environmental initiatives for the Ryder Cup dating back to the 1997 matches held at Valderrama in southern Spain, the organization of the 2018 edition (held at Le Golf National in Saint-Quentin-en-Yvelines, a southwest suburb of Paris) had a strong focus on sustainability. This included encouraging spectators to minimize travel and segregate waste, and committing to leave a lasting community legacy. Approximately 250,000 fans attended Le Golf National competition. Aiming to reduce any negative impacts on wildlife, the course managers and the French Golf Federation asked the Natural Museum in Paris to audit the wildlife, in the vicinity of the golf course. This established a database of existing wildlife information and a plan was developed to guide site management to minimize potential ecological impacts. The project is seen as a chance the sport's reputation and show its support for biodiversity conservation¹³.

It is obvious that the sustainability of a golf course needs rational and specific choices right from the choice of the site, which as a general principle must have an environmental, cultural and landscape value, a rich vegetation, a varied orography (flatland zones and slightly higher areas) and soil which does not have too many stones. Likewise important is the project phase, that implicates the assessment of the quality of the place, but also its function and potential (ecological value), and the management, that concerns the use of technical, eco-friendly solutions (Burdet *et al.*, 1998). It goes without saying that the realization of such projects constitutes an economic resource for the local community not to be neglected, in relation to the possibility of animating unexploited areas for tourism and recreation and to encourage the creation of new activities, increasing the global usability of the territory.

For these reasons, for over twenty years the focus has been particularly on the quality of the golf routes and the contribution that

¹² It is the most important international golf competition, held for the first time in 1927 in the USA, when Europe as a team competed against the USA.

¹³ Elsewhere in France, Golf Clubs in Chantilly and Viduban have followed Le Golf National by starting their own biodiversity audits, and others being encouraged to do the same as part of a larger project called the Biodiversity Programme in French Golf.

these plants can give in terms of the conservation and protection of the environment.

The Italian Golf Federation is carrying out various sustainability projects like *Impegnati nel Verde* (INV), an environmental recognition federal brand name given to those who voluntarily adhere to the project and demonstrate introducing effectively the protection systems planned. In particular, the Technical Scientific Committee gives a green flag, after evaluating the ecological interventions carried out and the environmental improvements achieved by each structure in relation to five categories (water, biodiversity, landscape, energy and historical, artistic and cultural heritage), that each has a specific guide line. Where biodiversity is concerned, the guideline of golf needs extended surfaces, inside which numerous habitats are created (lawns, strips of bushes, mini woods, lakes, rivers, canals) and very often rare species well worth being protected (Federazione Italiana Golf, 2017)¹⁴.

Among the aims of the INV is to make known to and accompany the Clubs to getting the International Environmental Certification GEO (Golf Environment Organization), a programme recognized by the IOC and by the leading associations of this category that protect nature, and provide the necessary technical assistance. GEO is a sustainability group founded to support the golfing industry, to make a positive ecological and environmental impact on both players and nature. Its vision is to place social and environmental issues at the roots of the game; to prove that golf is good for nature and communities. The criteria of the assignment of the environmental certification (which must be renewed every three years) are, for the golf courses, extremely rigid and strict and

¹⁴ In 2020 three Golf Clubs received the biodiversity recognition INV. The Ugolino Golf of Impruneta (Florence), renowned for its large and varied patrimony of trees (over 3600), has expanded in the last two years with many local plants and it has incremented the low maintenance areas, furthermore it placed artificial nests for those birds that fly in the area. The Albarella Golf Links of Rosolina (Rovigo), with the new management PlayGolf54, has started an important initiative on pollinator insects which will lead to the production of the rare honey Miele di Barena, also in keeping with the “green” philosophy. Albarella is aiming to become in the future the first island with zero emissions. The Golf Club Claviere in Turin, situated in the high part of Val di Susa, at 1,760 metres, has achieved recognition also thanks to its numerous uncultivated strips, ground squirrels, deer, chamois and foxes that run from one fairway to another, as well as centuries-old larch and also younger ones that are reintegrating those lost due to bad weather.

they go from the type of landscape, type of treatment, environmental quality, water and energy, all the factors that create a balanced and eco-sustainable ecosystem (Croce, Visentin, 2010).

Furthermore, GEO has its own substantial contribution to the development and execution of the project *BioGolf*, launched in 2015 and supported by the Istituto per il Credito Sportivo, the Italian Golf Federation and by the main organizations that in Italy deal with the environment, that is Legambiente, Federparchi and the Univerde Foundation. The BioGolf project is available to those wanting to strongly affirm the environmental compatibility of golf courses and the interest of developing and properly maintaining an area by creating golf courses. The label (BioGolf) would be granted when a number of environmental measures are respected, making it possible to create new low impact infrastructures or convert existing ones to sustainable management. The fundamental requisites for the creation of new BioGolf infrastructures will include limited land occupation and the use of buildings, including in high-quality facilities, which through sporting venues like golf courses, can often continue to be part of Italy's heritage. These are often otherwise neglected buildings that are poorly known to most people, which can be used anew as club houses or offices¹⁵.

Furthermore, the BioGolf Project is intended also as an alternative for the development of environmentally – friendly and sustainable golf-related tourism, which uses the environment as resource and opportunity, as competitive factor rather than a constraint.

The sustainable dimension of sports opens up new opportunities for golf tourism, that in Italy is gaining a significant role. One need only think that out of 386 Golf clubs, 104 have been defined by the FIG as a touristic vocation and there about 2 million presences connected with golf tourism, they reach 3,9 million if we include the nights spent by those who choose our Country for other reasons, but have practiced golf during their holiday. Furthermore, Italy is in 5th position for those sports commercialized on the markets of international tourism brokerage (14.4%), after cycling (36.1%), skiing (25.8%), trekking (24.7%) and soccer.

¹⁵ During the construction of a new plant the brand of quality BioGolf is assigned if the 18 parameters are respected, among which the most important concern basically the absence of chemical materials.

Among the reasons for such a success is the growing necessity to spend one's free time and holidays in places that offer tranquility and contact with nature and to stay in accommodation structures with a sustainable management of the activities. These results particularly amplified in a period of great difficulty and uncertainty, due to the health emergency linked to COVID 19, together with longer duration of the environment crisis, that obliges the relaunch of the sector also by means of the diffusion of sports practice and tourist activities, which can offer safe, authentic and healthy experiences. Golf, and also trekking, Nordic walking, skiing, cycling, canoeing, sailing etc., offer the opportunity to visit unpolluted places and develop innovative and complementary products in the traditional forms of tourism, combining a dynamic holiday with the contact with nature and personal recovery (Gazzellone, 2020).

Particularly interesting is the case of Golf Club della Montecchia, which is located in Selvezzano Dentro (Padova), near the Abano hot springs region and on the edge of the Euganean Hills Park protected area¹⁶. For many years, the golf course has been managed with a focus on environmental sustainability as reflected by the numerous environmental awards that the golf club has received at both the national and international levels: the INV in 2007 and 2012, Geo since 2013. In fact, ever since the end of the last century the Club has undertaken actions that have brought about energy and water saving and the reduction of chemical products; it has increased the wild areas in the zones outside the game courses¹⁷, with the consequent reduction of the fuel consumption used by the maintenance machines; it had adhered to the first ornithological research carried out in Italy on golf courses; and also improvements have been made to the turf.

These results have been achieved also thanks to the club's partnership with the Green Section of the Italian Golf Federation and the Universities of Pisa, Torino, Bologna, Roma e Padova. The most significant results come from the adaptability tests on warm-season species above the 45th parallel, which led to the conversion of the tees

¹⁶ The Club, enhanced with mirrors of water and various wild areas, is developed on 27 holes divided in: White Route; Red Route and Green Route (9 Pet Friendly holes).

¹⁷ It is not a coincidence that the Golf della Montecchia, above all when the wild areas were increased (from 4 in 2007 to 10 in 2014), that there were more hares, foxes, squirrels, pheasants, mallards, herons, woodpeckers and many other species.

and fairways from coolseason grasses to Bermudagrass¹⁸ in 2010. This application – the first at these latitudes – cut water consumption by 70%, the use of fertilizers by 80% and the elimination of pesticides. Thanks to this experience, numerous golf courses across Italy have started or are about to begin conversion programs to establish Bermudagrass on their tees and fairways. Golf Montecchia have also established partnerships with Spanish and Portuguese Superintendents and Agronomists to examine the possibility to introduce Bermudagrass in areas where cool-season grasses are traditionally used.

The Club's environmental management policy becomes even more actualized with the "ecological purchases": partial renovation of the maintenance equipment, selection of machines that consume less; renovation of the electric golf cars by choosing those with batteries that give a higher efficiency; purchase of course furnishings made from recycled material; construction of mini roads for golf cars with recycled aggregates.

The commitment to respect the environment and an eco-sustainable management have made it possible for the Club to receive the award IAGTO Sustainability Awards 2018 – Community value, a recognition given to the best golf destinations that have distinguished themselves for their environmental commitment and for adhering to the BioGolf project. In fact, since January 2015, the third nine holes at Golf della Montecchia, called the *Yellow Course*¹⁹, have been managed according to "Biogolf" protocol criteria requiring turfgrass management according to organic farming principles: maximum application of correct agronomic practices use of organic fertilizers only, no use of pesticides and identification of tolerance thresholds.

On occasion of the third edition of Venice Open, an international tournament of the U.S. Kids dedicated to junior category, an environmental screening of the golf event was carried out in collaboration with GEO. During the days of the competition, they promoted and popularized to the young participants the respect for nature: improvement of transport, waste sorting, recycling, promotion of

¹⁸ It is a grass found worldwide. It is native to Europe, Africa, Australia and much of Asia. they stand out for several reasons. For example, for the general qualities of the turf, the speed of planting and resistance to climatic stress in arid areas or without irrigation systems. The Bermudagrass form a dense, dense and resistant turf.

¹⁹ Since 2018 the "Yellow Course" has been renamed "Green Course".

local products, resource saving and the use of renewable energies. Moreover, the work carried out contributed to the elaboration of the criteria for environmental certification of a sports event devised by GEO.

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Not less important is the inclusion of Golf della Montecchia in the network of the *European Card of Sustainable Tourism*, an initiative of Federparchi and Parco Regionale dei Colli Euganei supported by Europarc, an organization that brings together the protected areas all over Europe.

The numerous awards received and the innovative scientific research carried out have demonstrated that a golf route managed according to environmental sustainability criteria does many functions: it represents an oasis for increasing and protecting the biodiversity and the functioning of ecological network; it has the role of buffer strips and filter strips with regard to the superficial and underground water and possible nearby protected areas; it consents the conservation of the landscape heritage; it provides precious green recreational spaces in urbanized contexts; it favors the saving of natural and economic resources; it creates employment in local communities.

Significant the efforts in this direction of the group PlayGolf54, an organization that manages the Golf della Montecchia, the Golf Club Terme di Galzignano, the Golf Frassanelle and Albarella Golf Link, according to the principles for the respect of nature, the protection of biodiversity, biological cultivations²⁰, demonstrating that to manage well

²⁰ It is enough to think of “Miele Millebuche” produced by bees that live in beehives placed along the route of Golf della Montecchia, exploiting the flowers of the numerous species present. This initiative was extended also to Golf Frassanelle and Abarella, and it is part of a project started by the Circolo in collaboration with Museo

the routes, it is fundamental to understand environmental aspects, not only as a reaction to external pressure exercised by those who complain about the environmental impact of golf.

Conclusion. – The reduction of the environmental impact related to activities, plants and sports competitions indicates the unavoidable necessity to react to the environment emergency which is getting more and more evident; for example a public 50 meters swimming pool consumes 400 tons of CO² a year; a 1st division football match emits 800 tons of CO² (Caneva, 2010; Cannavò, 2016); the artificial snow used for skiing on the slopes of the Alps causes serious consequences, like the excessive consumption of water, atmospheric pollution, energy expenditure, alteration of the biodiversity of the mountain slopes (Battistel *et al.*, 2020). Such situations require that the organizations and those in charge of the sports activities adopt suitable strategies and measures to support the diffusion of low impact technologies and high energy saving, as well as to encourage athletes and spectators to behave responsibly where the environment is concerned.

In line with this approach, some sustainability guidelines have been undertaken, like the initiative of the Chinese Government that, for the Winter Olympic Games in 2022 in Beijing, wants to make a low carbon emission pilot city, and the FIFA (Fédération Internationale de Football Association) wants to compensate the carbon emissions of the spectators at the World Cup Championship held in Russia or impose compulsory certificates in accordance with the standards of green building recognized on national and international levels in all the stadiums that have hosted this championship. Furthermore, there are also national (Italian) projects, like the CONI, that is collaborating with ASviS (Alleanza Italiana per lo Sviluppo Sostenibile) to implement in its plan of concrete actions which aims at reaching the SDGs and to integrate these objectives in its own strategy and processes of reporting on sustainability.

Entomologico Esapolis of Padova, which included a research that aimed at identifying the role of the eco-sustainable golf courses like those of the Club of Sevizzano for the protection of pollinator insects. In the future projects there is also the one to make beehives with different styles and shapes, to attract the bees in the best way possible, and to promote the golf players' and public's curiosity and interest in respecting the environment.

The environmental awareness of a territory depends quite significantly on the quality and capacity of the regeneration of the natural resources. In the case of golf, the assessment must be based on the effects that this sport exercises on the biotic and abiotic components of the natural environment. This analysis has demonstrated how golf courses can fit in the territory harmoniously so much as to represent a factor for the rebirth and regeneration of an area compromised by destructive activities (former caves, anthropized areas etc.) or, if included in the protected areas, to compete to diversify even more the environmental mosaic, creating protected oases for nature. Furthermore, it has highlighted how the development of this sport is more and more linked to the promotion of forms of sustainable tourism and the demand of more quality of eco-compatible structures which will become a strong accelerator for golf tourism.

It goes without saying that the present situation of emergency caused by COVID-19 has brought about new models for travelling, inducing tourists to go to domestic and safe destinations, and that offer more opportunities to do activities outdoors. In Italy, according to the Isnart (2020) surveys, the number of Italians who practise sports has almost doubled (from 18% summer 2019 to about 32% summer 2020) and the choice of their destinations was focused on environmental and naturalistic contexts, confirming the hypothesis – put forward during the period of the lockdown – revival, from the tourism profile, also in the internal and marginal areas (1.8% tourists went to hilly and rural locations) where the environmental integrity has reinforced the attractiveness that has made it possible to begin the processes of territorial tourism valorization (Cresta, 2020).

BIBLIOGRAFIA

- BATTISTEL D. *ET AL.*, “Sostenibilità ambientale, cambiamenti climatici e attività sportive: una review sul tema”, *Ingegneria dell’Ambiente*, 2020, 7, 4, pp. 301-322.
- BIZZARRI C., “Gli impatti economico-ambientali delle attività turistiche sulle risorse naturali”, in BIZZARRI C., QUERINI G. (a cura di), *Economia del turismo sostenibile. Analisi teorica e casi studio*, Milano, FrancoAngeli, 2006, pp. 75-95.

- BURDET ET AL., *Golf. Pianificazione del territorio Paesaggio – Ambiente*, 1998, https://www.bafu.admin.ch/dam/bafu/it/dokumente/landschaft/uv-umwelt-vollzug/golf_raumplanung-landschaft-umwelt.pdf.download.pdf/golf_pianificazonedelterritorio-paesaggio-ambiente.pdf.
- CAGGIATI P., BAZZANI G.M., *Valutazione degli impatti ambientali dell'attività golfistica in relazione a quella agricola*, Bologna, Consiglio Nazionale delle Ricerche, Istituto di Biometeorologia, 2008.
- CAGGIATI P. ET AL., *Gli effetti ambientali delle attività ricreative sul territorio. Il caso del golf in Italia*, Bologna, Ge.S.T.A - D.E.I.AGRA, 1999.
- CANEVA S., *In Sud Africa si produrranno 2,75 milioni di tonnellate di CO2*, 2010, <https://www.focus.it/tecnologia/innovazione/in-sud-africasi-produrranno-275-milioni-di-tonnellate-di-co2>.
- CANNAVÒ S., *Sport e Sviluppo Sostenibile*, Roma, UISP, 2016, http://www.a21italy.it/wp-content/uploads/2014/04/Cannavo_1_AN16-7-lug-16.pdf.
- CONSIGLIO DELL'UE, *Gazzetta Ufficiale dell'Unione Europea del 13.12.2018*, [https://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=CELEX:52018XG1213\(01\)&from=E](https://eur-lex.europa.eu/legal-content/IT/TXT/PDF/?uri=CELEX:52018XG1213(01)&from=E).
- CRESTA A., “L'emergenza covid-19 e il riposizionamento del turismo nelle aree interne: prime riflessioni sull'Irpinia”, *documenti geografici*, 2020, 2, pp. 29-51.
- CROCE P., VISENTIN M., “Certificazioni Ambientali: da ‘Impegnati nel Verde’ a ‘Golf Environment Organization’, l'evoluzione della certificazione per percorsi di golf”, *Spazio Sport*, 2010, IV, 16, pp. 55-58.
- DINGLE G., MALLEEN C., *Introduction to Research on Sport and Environmental Sustainability*, London, Routledge, 2020.
- FEDERAZIONE ITALIANA GOLF, *Riconoscimento ambientale “Impegnati nel verde” Linee guida – cat. Biodiversità*, 2017, <https://www.federgolf.it/wp-content/uploads/2017/02/Linee-guida-INV-BIODIVERSITA.pdf>.
- FURRER P., “Giochi Olimpici sostenibili: utopia o realtà?”, *Bollettino della Società Geografica Italiana*, 2002, 4, pp. 795-830.
- GAZZELLONE A., “I turismi sportivi emergenti”, in GIUNTARELLI P. (a cura di), *Turismo sportivo. Teoria e metodi*, Roma, Amando Editore, 2020, pp. 78-118.
- GIUNTARELLI P., “Il rapporto tra Sport e Turismo: un'unione di interessi”, in GIUNTARELLI P. (a cura di), 2020, pp. 15-54.

- GRUMO R., IVONA A., “La pratica del golf e lo sviluppo territoriale. Un’analisi multi-scalare”, *Geotema*, 2017, XXI, 54, pp. 54-64.
- ISNART, *Il Covid cambia le vacanze degli italiani*, 2020,
<https://www.isnart.it/economia-del-turismo/indagini-nazionali/indagine-2020/>
- IUCN, *Informing Decisions on Trophy Hunting*, Gland, Switzerland, 2016,
<https://www.iucn.org/commissions/commission-environmental-economic-and-social-policy/our-work/sustainable-use-and-livelihoods/resources-and-publications/iucn-briefing-paper-informing-decisions-trophy-hunting>.
- IUCN, *Sport and Biodiversity*, Gland, Switzerland, 2018,
<https://portals.iucn.org/library/node/47599>.
- IUCN, *Mitigating Biodiversity Impacts of Sports Events*, Gland, Switzerland, 2020, <https://portals.iucn.org/library/node/49025>.
- LIPU, POLITECNICO DI MILANO, *Contributi alla Strategia nazionale per la Biodiversità: il ruolo della compensazione ambientale*, Roma, Ministero dell’Ambiente e della Tutela del Territorio e del Mare, 2013.
- MATM, *La Strategia Nazionale per la Biodiversità*, 2010,
https://www.mite.gov.it/sites/default/files/archivio/allegati/biodiversita/Strategia_Nazionale_per_la_Biodiversita.pdf.
- MELIS G., SPANEDDA L., “Il golf in Sardegna: opportunità di sviluppo o minaccia ambientale?”, in CAMPISI B., NOVELLI V. (a cura di), *Il contributo delle scienze merceologiche per un mondo sostenibile, Atti del XXV Congresso Nazionale di Scienze Merceologiche (Trieste-Udine, 26-28 settembre 2011)*, 2012, Udine, Forum, pp. 229-236.
- MERCATANTI L., “Lo sviluppo del turismo del Golf in Sicilia”, *Geotema*, 2017, XXI, 54, pp. 73-80.
- MOYLE B.D. ET AL., *Sport Tourism and Sustainable Destination*, London, Routledge, 2020.
- ONU, *Agenda 2030 per lo Sviluppo Sostenibile*, 2015,
<https://unric.org/it/wp-content/uploads/sites/3/2019/11/Agenda-2030-Onu-italia.pdf>.
- PIOLETTI A. M., “Altamente sportivi. Lo sport tra *milieu* e attrazione turistica”, *Studi e Ricerche di Geografia*, 2018, XXX, 2, pp. 153-156.
- PRIVITERA D., “Il *running* e il ‘fenomeno’ delle maratone cittadine”, *Geotema*, XXI, 54, 2017, pp. 90-96.

- SORRENTINI A., *Il Business degli eventi sportivi. Aspetti strategici ed operativi*, Torino, Giappichelli, 2010.
- SORRENTINI F., “Sport, ambiente e territorio. le scelte di sostenibilità”, in BIANCO R. (a cura di), *Economia e gestione delle imprese sportive*, Napoli, Rogiosi editore, 2020, pp. 392-441.
- THE BIODIVERSITY CONSULTANCY, *A Cross-sector Guide for Implementing the Mitigation Hierarchy*, Cambridge, 2015, www.csbi.org.uk/tools-and-guidance.
- UISP, *Gli eventi sportivi sostenibili*, Bologna, 2012, www.uisp.it/emiliaromagna/files/principale/01SEZIONI/Sostenibilita/documenti/uisp_eventi_sportivi_sostenibili_introduzione_panoramica.pdf.
- WIPF S. ET AL., “Effects of Ski Piste Preparation on Alpine Vegetation”, *Journal of Applied Ecology*, 2005, 42, 2, pp. 306-316.

Gli impatti ambientali delle attività sportive. Le buone pratiche di sostenibilità. Il caso del golf. – Lo studio intende evidenziare l'intensa e difficile relazione tra sport e ambiente prendendo in esame il caso del golf, uno sport che richiede una pianificazione e gestione dei percorsi più attenta e consapevole degli impatti ambientali, non solo per fronteggiare le pressioni esterne esercitate da coloro che denunciano gli effetti negativi sull'ambiente del golf, ma anche per ragioni economiche e pratiche di gioco. Efficienza energetica e uso di fonti rinnovabili, risparmio idrico, riduzione di prodotti chimici, limitazione dei rifiuti; conservazione della biodiversità; sensibilizzazione del pubblico sono obiettivi determinanti per l'affermazione dello sport sostenibile, una dimensione che esige, da un lato, l'impegno delle organizzazioni sportive, dei responsabili di eventi e di tutti gli *stakeholder* a vario titolo coinvolti di perseguire dette finalità e, dall'altro, un costante interesse e sostegno della ricerca scientifica per promuovere nuove conoscenze e comprendere le dinamiche del rapporto tra sport e ambiente.

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