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Article

# Natural environments of the city for sport activity: Case study of Malaga (Spain)

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**Abstract:** Previous studies support the direct relationship between outdoor physical activity and natural spaces in cities. The Active City and Nature concept explores the relationship between urban, green and active environments; it aims to demonstrate the scientific evidence for the need for action to be taken to increase participation in active living and sport, leading to healthier cities and communities. Our research seeks to analyse the city's natural spaces as scenarios to encourage physical activity and sport, through a combined study of qualitative research techniques: the use of a digital webGIS platform, collaborative maps made by citizens, and surveys conducted with citizens and the local government. This methodology has been tested in the city of Malaga, the European City of Sport 2020. The study of the city's main sport areas, the waterfront and natural green spaces provided data on the types of physical activity taking place in each of these areas and the physical activity needs of citizens. This research argues that it is important to know the criteria of local communities for physical activity and/or sport in natural environments, as well as the main demands expressed. This will provide valuable information to design and manage natural public spaces as a means of promoting physical activity and healthy habits.

**Keywords:** natural areas; active city; sport activity; local communities; GIS technologies; healthy city

## 1. Introduction

### 1.1. Starting points: Sedentary behaviour and physical inactivity

Although sport has developed significantly as a form of leisure in recent years, physical activity in people's daily lives (e.g., at home, at work, shopping, mobility...) has decreased considerably. According to the World Health Organisation (2024), overweight and obesity have reached epidemic proportions in Europe and are on the rise, and it urges countries to take action to curb these diseases. Fifty-nine per cent of adults and nearly one in three children are overweight or obese (WHO, 2024). As regards physical inactivity and sedentary lifestyle in the Spanish adult population, this lack of activity is responsible for 13.4% of deaths per year in Spain, claiming more than 52,000 lives. Moreover, our country is one of those with the highest physical inactivity in the European Union (Mayo et al., 2017).

### 1.2. City and health

Developed countries are now facing the health challenges of the 21st century. In 1948 the WHO Constitution defines health as "a state of physical, mental and social

well-being and not merely the absence of disease" (WHO, 1973). This definition recognises that health encompasses a wide range of factors, moving away from the traditional focus on medical treatment towards a broader vision of prevention, in which environmental factors are fundamental. Since 1986, the WHO has understood the importance of the urban environment in promoting a healthy lifestyle with the deployment of the "Healthy Cities" programme and the concept of the "active city" (Pardo Miranda et al., 2022).

The "Delivering Healthier Communities in London" guidance document (NHS London Healthy Urban Development Unit and CREH, 2007) highlighted new relationships between health and the built environment and residents. The main determinants of health are shown in the diagram developed by Dahlgren and Whitehead (2021). These factors are mostly related to aspects of the built and urban environments: daily habits, social relationships and community influences, specific conditions such as housing and work, as well as general socioeconomic, cultural and environmental conditions. This same report points out that urban diseases are mainly related to a sedentary lifestyle and poor air quality. The document includes a list of cardiovascular and respiratory diseases, obesity, heat and cold strokes, accidents and mental illnesses.

Air quality is a particularly important environmental factor for sport activities as well as daily activities in cities. For this reason, the relationship between some air pollutants and epidemic diseases such as COVID-19 has been researched (Ulutaş et al., 2023). In addition, the contribution of certain air pollutants to mortality rates in the city can be estimated with software developed by the WHO (Ulutaş, 2022).

The VII Phase of the WHO European Healthy Cities Network (2019–2024) is currently underway in Europe; and focuses on the health and well-being of Europeans by organising policies based on equity and governance. As a measure of health and well-being, an active and healthy lifestyle is promoted in different places and points where people live, love, work and play. Their action lines identify the importance of healthy transport for the population to be physically active (WHO, 2019).

### 1.3. Active city and nature

The Active City and Nature concept explores the relationship between urban, green and active environments. It aims to demonstrate the scientific evidence for the need for action to be taken to increase participation in active living and sport, leading to healthier cities and communities.

An "active city" is a subcategory of a "healthy city" (Edwards and Tsouros, 2008). It is characterised by the promotion of an environment that encourages daily physical activity for all its residents through the creation and continuous improvement of social and urban opportunities, and the development of community resources (Edwards and Tsouros, 2008). This approach seeks to keep citizens physically active through high levels of active transportation and participation in sport activities (Dauman, 2014). More comprehensively, active physical activity is defined as that which involves muscle movement and an energy expenditure greater than the resting state. This includes (1) active mobility (walking and cycling), (2) informal or competitive active sport, and (3) recreation and play (Pardo Miranda et al., 2022).

When we apply these concepts to the project, we refer to active natural environments as those that foster walking, promote the use of bicycles, encourage physical and sport activity, or play and recreational activities.

(1) Active mobility. Walking or cycling to work, regularly and for at least 30 minutes, contributes positively to individual health and people's social interactions (Dora and Philips, 2004). It also reduces the risk of accidents and pollution (Rabl and de Nazaelle, 2012). A comprehensive approach to active mobility is important, i.e., not only in terms of health and the environment, but also in relation to city design, urban planning, and aspects such as governance, citizen participation, and communication (Ruiz-Apilanez and Solís, 2021). The relationship of local communities with natural environments there plays a fundamental role in promoting healthier lifestyles as well as in strengthening social cohesion and the well-being of these communities.

(2) Informal active sport. Informal active sport refers to a dynamic and non-competitive physical activity that can be carried out in any open space, contributing to the inclusion of people at risk of social exclusion (González López et al., 2016). Due to the wide range of benefits that sport offers people, the sport management of cities allows not only health problems to be addressed, but also economic, social, or environmental ones. Sport not only encourages social ties, but also helps to break down barriers and prejudices in society, fostering values such as trust, solidarity, respect, and cooperation. As many sporting activities take place in direct contact with nature, that the design of active cities must be committed to the preservation of nature and its biodiversity (Consejo Superior de Deportes, 2007).

(3) Gamification and sports. Physical activity and sport are intertwined with the importance of play in human development. Both physical activity and sports are vehicles that allow people to explore and enhance their physical, social, and intellectual abilities. From childhood, where play is fundamental according to Tonucci (2015), to adulthood and old age, participating in physical and sport activities not only helps us maintain our abilities, but also contributes to delaying the aging process. In this sense, the integration of physical activity and sports into daily life becomes a key pillar in promoting comprehensive human development and a healthy life throughout all stages of life.

### 1.4. Natural environments for exercising, playing sports and adopting healthy habits

Natural spaces are one of the main points of interest for citizens when it comes to sports (Cornax-Martín et al., 2020). The social demand for sport activities in the natural environment shows strong and constant growth. Health and natural landscape are two aspects that are significantly related, with the landscape being a resource with potential for physical, mental and social well-being (Abraham et al., 2009).

The benefits of physical activity for people with mental health problems and depression have been demonstrated, particularly in natural environments (Walter et al., 2023). There is a direct relationship between health benefits and the use of urban green spaces. Studies found a strong relationship between the availability of places to be physically active in the community and mental health benefits (e.g., Lafrenz

(2022)). In urban areas, artificial sport fields may be affected by the potential city pollution (Ulutaş, 2023). Therefore, natural sport areas have a very important function. The benefits from doing sports in natural spaces compared to closed spaces in the city are related to the comfort that these spaces provide, such as breathing fresh air and a stronger connection with nature, along with more social relationships (Cornax-Martín et al., 2020).

Consequently, administrations directing measures and policies to promote sport in these natural areas of the city seems reasonable. The restoration of natural habitats helps to maintain and improve the biodiversity of these spaces and, at the same time, puts them at the service of citizens. In March 2023, Torrelodones City Council (Madrid, Spain) unveiled its Active City Plan, which will transform not only the urban area but also the natural spaces of the municipality, with the aim of promoting an active and healthy lifestyle among its citizens (INICIO, 2023). Zaragoza City Council focuses on the importance of physical activity in natural spaces thanks to a concept called "Green Exercise", which is defined as physical activity taking place in urban or wild natural spaces. Different studies support the benefits of sports in natural environments compared to those closed urban environments. Green exercise underpins its research on nature-based therapies and the way of living and relating to it (Ayuntamiento de Zaragoza, 2019). However, there must be a midpoint between promoting the enjoyment and use of green areas for sport activity and caring for the environment. In Catalonia, sport and leisure activities in nature are common in the different protected natural spaces; therefore, the administration must protect nature and avoid disturbing protected species (Generalitat de Catalunya, 2024).

### 1.5. New technologies and healthy physical activity in urban areas

Applications that enable exploring, evaluating and stimulating physical and sport activity in urban environments are of particular interest. They are a valuable tool not only for athletes, but also for understanding informal sport in urban areas. These apps have become essential to promote an active lifestyle and to map the various forms of physical activity that take place in cities, thus contributing to a greater awareness of the importance of staying active in urban environments (Koohsari et al., 2015). Citizens increasingly share information on social networks about the routes and places they choose for their physical and sport activity, because of their suitable technical conditions, landscape values or other reasons.

There are a large number of sport applications of this type, such as "Strava" (a social network based on the use of the internet and GPS mapping mainly of bike and running routes; www.strava.com), "Mapmyrun" (a social network to monitor and share races with other users of a community; www.mapmyrun.com), "Nike + running" (a social network of runners that allows users to share metrics, routes, even competitions; www.nike.com), the now defunct "Endomondo" (www.endomondo) etcetera. All of which allow a database to be constructed with information provided by the user community and athletes: type of activity, location, description of activity, definition of difficulty, metrics, comments, ratings, etc. (Nebot-Gomez de Salazar et al., 2023).

The data on informal routes within the city provided by cyclists, swimmers and runners, as well as other sport activities, become a very valuable source of information to know what the habits of the citizens are in relation to sports and physical exercise: What kind of informal physical activities do they do? Which urban spaces encourage physical activity? Which neighbourhoods are most likely to be involved in sport? Geographic Information Systems (GIS) and applications become a very useful tool to measure and locate regulated and unregulated sport activity in the city. Local administrators, technicians and planners can use these tools to implement urban, sports and social measures and policies in the areas where they are needed (Cornax Martín et al., 2019).

## 1.6. Background

This work is based on previous research by the authors in relation to the creation of an open-use website (https://activamalaga.com/) (**Figure 1**) aimed at geo-referencing informal sporting activity by citizens. To this end, a collaborative map has been created to record sporting activities in order to identify the areas with the best resources or the ones are most conducive to physical activity in the city, and to share and publicise the most suitable spaces for sport in the city. As a means of disseminating the website, awareness campaigns have been carried out through social networks and local media such as radio and television (https://www.youtube.com/watch?v=lQnWVR8EAok).

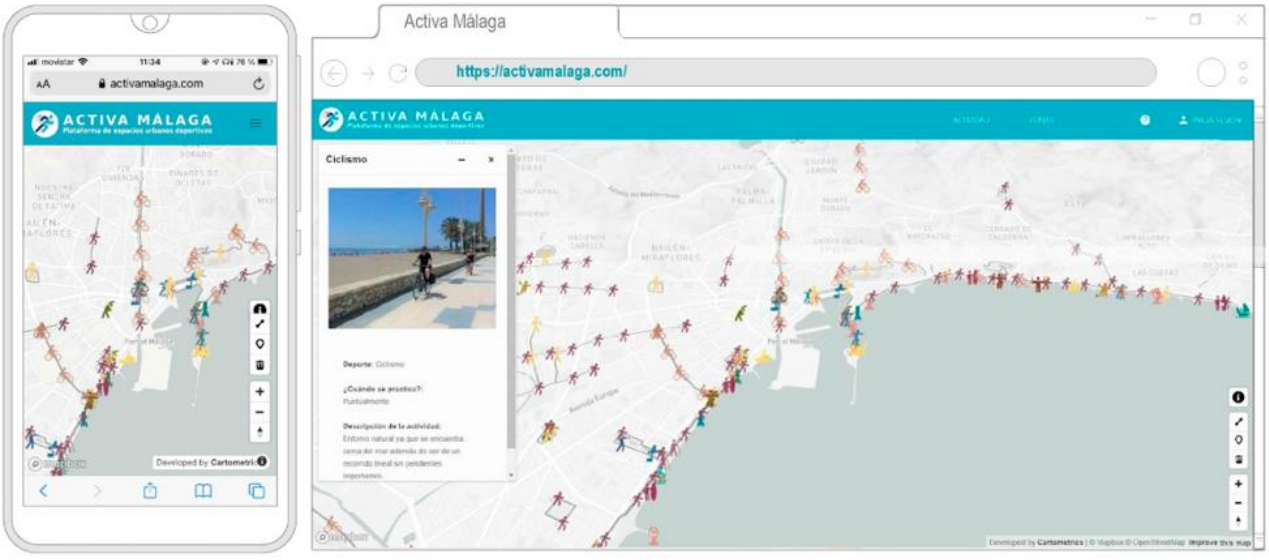


**Figure 1.** Activa Málaga webGIS digital platform: www.activamalaga.com.

Source: Activa Málaga Project (Network of Strategic Chairs, Universidad de Málaga—Malaga City Council).

As a result of the previous research, we have identified the areas where local communities in the city of Malaga, Spain, can do outdoor sports in an informal way (**Figure 2**) (Cornax-Martín et al., 2020).

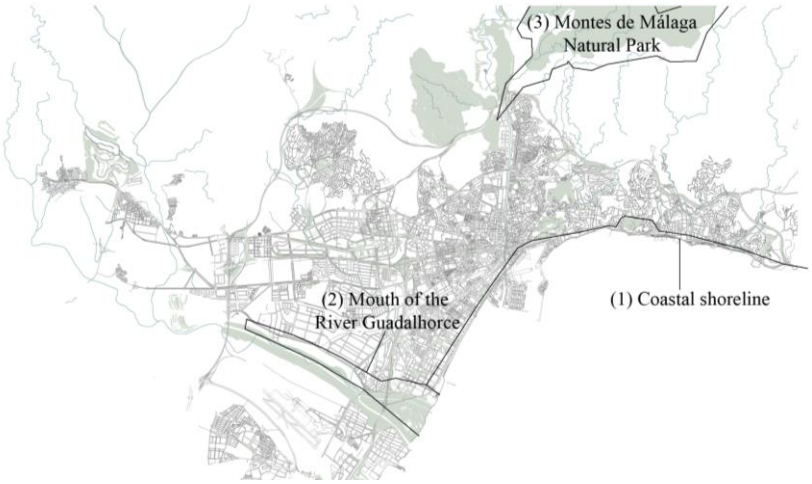


**Figure 2.** Areas of sporting concentration in the city of Malaga.
Source: authors.

## 2. Materials and methods

This research seeks to give continuity to the aforementioned earlier work and, specifically, to analyse natural spaces in urban environments as optimal scenarios for physical activity and sport. To this end, a study is proposed that combines the use of the webGIS digital platform, collaborative maps made by citizens and surveys carried out with citizens and the local government. The city selected as a case study is Malaga, a city, whose territory has a varied morphology, consisting of both coastal and mountainous areas. Malaga was the European City of Sport in 2020, in which led to increased sporting activity. Its Mediterranean climate is optimal for outdoor sports, as winters are mild and summers warm. Malaga has an annual average of 300 days of sunshine and only 50 days of rain (Universidad de Málaga, n.d.).

Previous research by the authors (Cornax-Martín et al., 2020) identified the points in the city of Malaga where most informal sporting activity takes place (**Figure 2**). The contribution of the present research is to focus on the public areas and spaces related to the natural environment as promoters of physical activity, by analysing the social profile of the people who use these settings for sport and the preferences of the type of sport or activity.

The methodology consists of three main phases (**Figure 3**).

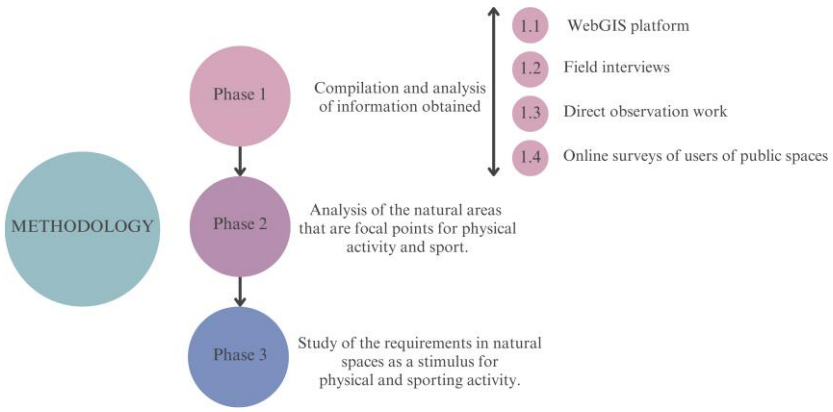


**Figure 3.** Methodology phases.
Source: authors.

Phase 1: Preliminary studies.

Compilation and analysis of information obtained from the following sources: (1) webGIS platform, (2) field interviews, (3) direct observation work, and (4) online surveys of users of public spaces. Various sources, including, were used to obtain information to geolocate informal sporting activity in the city. It should be noted that local authorities keep records of sport that is considered formal, i.e., that which takes place in regulated sport facilities, and this information is freely available to the public (https://datosabiertos.malaga.eu/group/deporte). This process was carried out in several stages:

(1.1) Compilation of shared information geolocated on the Activa Málaga webGIS platform. This web-based mapping tool allows citizens to upload information for the collective construction of a unique database. It likewise enables citizen participation and interaction between users.

(1.2) Direct observation of the urban space and quantified recording of the activity through the use of photographs and videos to analyse the type of sporting activity.

(1.3) Survey of the community of users of the public space (women and men) in situ through fieldwork to obtain data on the choice of certain spaces for physical activity, the characteristics of the places to be chosen as sport spaces, as well as improvements and suggestions for intervention in these spaces. A study was carried out of the areas of the city where the greatest number of people engaged in outdoor sports are located, followed by personal interviews there. The interview was answered anonymously to comply with data privacy.

(1.4) Interview-form for data collection and subsequent uploading to the webGIS platform (women and men). An online form was created and disseminated through different digital media in order to obtain the maximum number of responses. The questionnaire was run through Google Forms, using the different social networks of the research team as a means of dissemination. The interview was answered anonymously to comply with data privacy. **Table 1** contains the questions on the form.

**Table 1.** What sport do you do in the public space of your city?

| **Ask** | **Answer** |
|---|---|
| Sex | Men, women, not answer |
| Age | 0–15, 15–40, 40–60, more than 60 |
| What sport do you do? | Basketball, handball, baseball, bmx, callisthenics, cycling, drone, stretches, soccer, kayak, sports, walking, Nordic walking, free swim, paddle surf, parkour, weight training park, skating, petanque, rowing, running, skate, surf, candle, volley windsurfing, yoga, other |
| Where do you engage in your activity? (indicate the street, square or address) | Free |
| Do you frequently use that space? | Yes, no, from time to time |
| What do you like most about that space? | It is a safe space; it is a large space; it is a space located in a natural environment; it is a linear space; it is close to my place of residence; it is close to my workplace; it is a space where I meet other athletes; it meets the appropriate technical conditions for sporting activity; it is a pedestrian area; there are no annoying noises; it is a quiet space; it has areas where you can rest; other |
| What improvements would you make to the space? | Better paving; better furniture; better accessibility; improved sport facilities; greater feeling of safety; better lighting; more rest areas |

**Table 1.** (*Continued*).

| Ask | Answer |
|---|---|
| What improvements would you introduce to street furniture? | More water fountains; more benches; more shady areas; more green areas in public spaces (trees, hedges, grass, etc.); more bike parking spaces; stretch areas; better lighting; changing facilities or toilets |
| Would you like the city council to improve this space? | Yes, no, other |

Note: Citizen questionnaire on sporting activity. The questions were designed by authors.

Phase 2: Analysis of the natural areas that are focal points for physical activity and sport.

The second phase of the methodology analysed the most preferred areas for outdoor sports, according to previous research by the authors (Cornax-Martín et al., 2020). The previous article concluded that the areas preferred by public space users coincide with the areas closest to the natural environment (**Figure 2**). This research has focused on three main areas, all of which are natural spaces: (1) coastal area, (2) Guadalhorce estuary, and (3) Malaga mountains.

A database was created with the information previously obtained in the (1.3) on-site interviews with the user community and (1.4) online interview form phases, in order to carry out an analytical study of the three above-mentioned areas. The data obtained in this phase focuses on the type of sporting activity in each of the three natural environments to be studied. The questionnaire includes questions about the type of activity in each of the three natural environments, and the gender and age of the users.

Phase 3: Study of the requirements in natural spaces as a stimulus for physical and sporting activity.

The aim of this last phase is to study the needs proposed by users of public spaces for physical activity and sport outdoors, particularly in the city's natural spaces. The ultimate goal is to guide the intervention of the relevant authorities in order to promote sport and physical activity in these environments.

The Google Forms digital questionnaire was again used (Phase 2 of the methodology) to obtain the information. It included several questions on problems and possible improvements to be made in the different areas to encourage sporting activity.

## 3. Results and discussion

### 3.1. Collaborative map of physical activity in natural areas

Thanks to the citizen input on the *Activa Málaga* webGIS digital platform, a geolocated map is obtained of the different physical activities carried out in the urban space of the city of Malaga and, specifically, in the different natural areas. This result allows us to quantify the physical activity carried out in the different areas of the city, as well as the type of activity in natural spaces. The most common physical activity in all the natural areas of the city was running, followed by cycling.

The difficulty with this part of the research is that the information captured depends on the information that citizens upload to the platform, but there is enough information on the collaborative map to draw some preliminary conclusions.

### 3.2. Results of the surveys

It can be concluded from the survey results (with a sample of 193 respondents) that citizen consider that a natural environment is the third most important factor when it comes to outdoor and informal sport. A total of 35.23% of respondents selected this condition as one of the most important factors when choosing a place to do sport, after proximity to the place of residence and the linearity of the space (Cornax-Martín et al., 2020). In addition to these priority factors when it comes to doing sport in public spaces, the following responses also stand out:

- 18.65% of the respondents stated the importance of doing sport in a vehicle-free environment.
- 18.65% of those surveyed indicated a preference for quiet spaces,
- and 8.80% for a noise-free environment.

All these qualities are intrinsic to the city's natural green spaces. Citizens need privacy and tranquility in these spaces when engaging in physical activity and/or sport, due to the benefits they bring to both physical and mental health (Lafrenz, 2022).

### 3.3. Results of the study in natural areas

A comparison is made between the different areas where informal sport is concentrated, namely (1) the coast, (2) the end of the Guadalhorce estuary, and (3) the Montes de Málaga Nature Reserve, as shown in **Figure 2**. These study areas have their proximity to the natural environment in common. As in many previous studies, the role of the natural environment as a generator of informal sporting activity is highlighted. Many parks and green spaces, in addition to having formal sports facilities, are seen as places where sport is played informally (Magrinyà and Mayorga, 2008).

In the case study of the natural areas of the city of Malaga, the main focal points of physical activity can be classified into two types, mainly according to the type of natural area to which they relate:

- Natural areas near the coast. The (1) coastline and (2) the end of Guadalhorce estuary fall in this category.
- Natural areas near green spaces. This category includes (3) the Montes de Málaga Nature Reserve.

Results were obtained in each natural area on how the management of this public space affects the activities that take place there. The outcome is to a set of requirements that users want in a specific natural environment and which, according to their criteria, favour physical activity to a greater extent. The design and management activities of urban green spaces should adopt public health strategies to maximise the health potential of these spaces (Lafrenz, 2022), with public administrations being responsible for the management of these spaces.

The main difficulty we encountered in developing the research was conducting field interviews with sportspeople, as they were reluctant to interrupt their physical activity to be interviewed. On the other hand, the sample could be increased in future research, especially in an age group between 15 and 40 years old, which is not as representative in some natural environments.

The results for the three study areas are as follows:

(1) Waterfront

This is the most popular area of the city for informal sports. The linearity of the promenade allows for sports that require route continuity, which is one of the most sought-after citizen requirements according to the survey results. The coastline of the province of Malaga is home to the greatest biodiversity to be found in the Mediterranean and in the seas off Europe. This is thanks to its strategic biogeographic enclave, where species converge from the European Atlantic, from the Mediterranean, from the subtropical zone of Northwest Africa, and endemic species to the Strait of Gibraltar (Diputación Provincial de Málaga, n.d.c). Malaga City Council has installed two formal running lanes along the promenade: the West Running Lane that is 7.5 km long and the East Running Lane with a total length of 9.7 km (Malaga City Council website; https://deporte.malaga.eu/espacios-deportivos/carriles-running/). Both lanes are used for a wide range of sporting activities and run parallel to the coastline (**Figure 4**).

**Figure 4.** Photographs of the waterfront sport area.

Source: authors.

In particular, when analysing of the demographics of people who do sport in the coastal area, it can be seen that almost as many men as women engage in sport there and that the main age group is between 40 and 60 years old, with the over 60s being the profile least likely to do sport in this area (**Figure 5**).

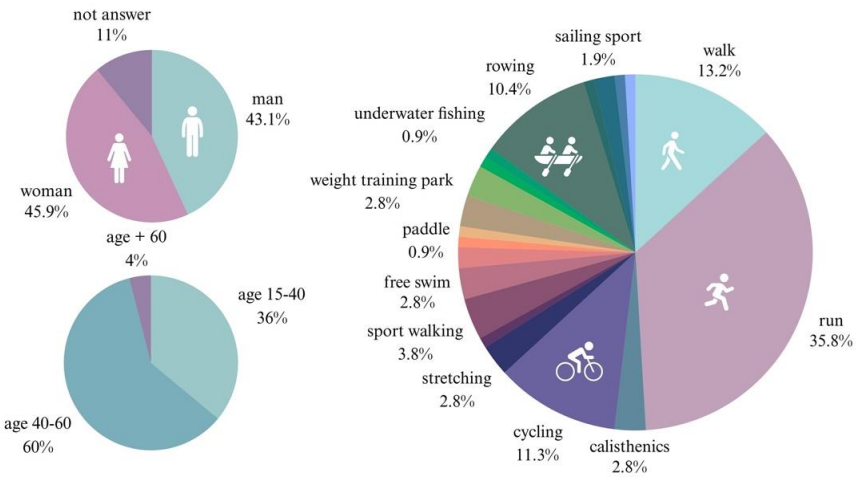


**Figure 5.** Gender, age and most frequent sporting activity of respondents to the survey conducted in the coastal area.

Source: authors.

The most popular sport activities on the waterfront are (1) running (with 35.8% of respondents), (2) walking (with 13.2% of respondents) and (3) cycling (with 11.3% of respondents). There is now a cycle path along the entire western line of the promenade, which facilitates sports such as cycling and skating in this particular area of the waterfront.

Another of the most important results obtained is the demand of those who engage in physical activity to improve the space of the coastal strip to make it a more conducive and pleasant sport environment (**Figure 6**). The three most important results of the surveys were the need to improve the paving (26.4%), to improve the sport facilities (25.5%) and to improve the furniture (13.6%).

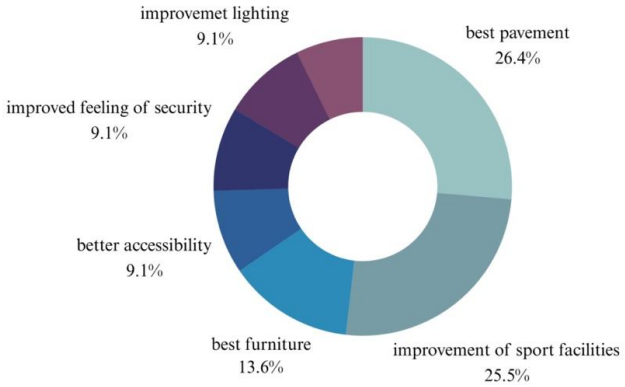


**Figure 6.** Citizen demands in the coastal sport area.

Source: authors.

(2) The mouth of the Guadalhorce River

The Guadalhorce estuary is an area in the city of Malaga that connects the end of the estuary to the western coast. It covers an area of 122 hectares and its boundary are the last two branches of the Guadalhorce River. The mouth of this river, which was declared a Natural Site in 1989, is formed by the branches of the Guadalhorce River with running waters and an artificial lagoon complex with stagnant waters. Its proximity to the Strait of Gibraltar makes it a stopover and rest area for coastal migratory birds; it is therefore a first-rate spot for bird watching (Diputación Provincial de Málaga, n.d.a). It is an area of great environmental wealth and diverse habitats. A wooden footbridge over the riverbed encourages physical activity and creates an attractive environment for people to enjoy activities such as running and walking. This space is mainly untouched by human action, with natural paths and trails (**Figure 7**).

**Figure 7.** Photographs of the Guadalhorce sport area.

Source: authors.

From a social point of view, 66.7% were women and 33.3% were men aged between 40 and 60 using this area for sport (**Figure 8**). The most popular sport activities at the mouth of the Guadalhorce River were (1) running (with 75% of respondents) and (2) walking (with 25% of respondents). Since it is located in an area that is continues on from the promenade, many of the people who exercise along the coast extend their route through this natural space and vice versa, as these two natural spaces are connected.

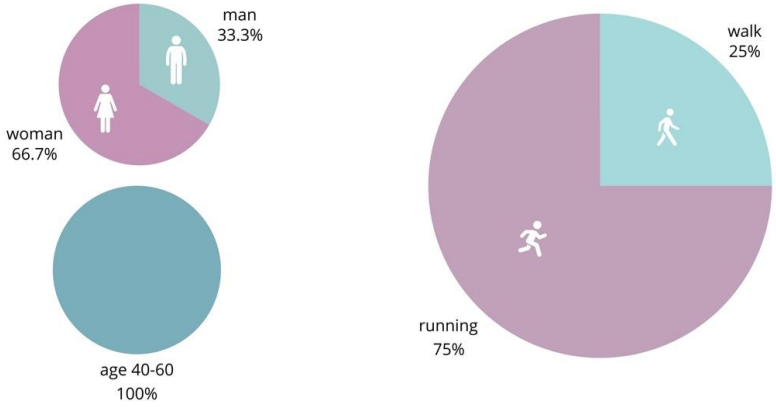


**Figure 8.** Gender, age and most common sport of the survey participants at the Guadalhorce estuary.
Source: authors.

Compared to the coastline (1), there is not a great deal of administrative intervention in the design and management of the area to promote sporting activities. The results of the surveys on improvements in this area are as follows: 50% suggested improving the accessibility, 25% suggested better lighting and a further 25% called for a greater feeling of safety (**Figure 9**). According to the results of the survey, more women than men (50% of the women surveyed), pointed out the need for better the lighting which points to their feeling unsafe there.

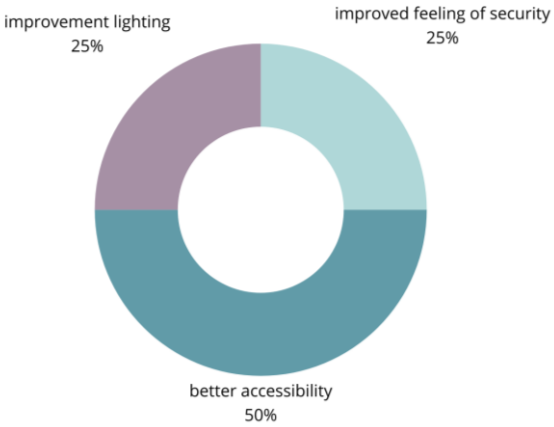


**Figure 9.** Citizen demands in the Guadalhorce sport area.
Source: authors.

(3) Montes de Málaga Nature Reserve

This natural park is the city's most popular natural mountain area for physical and sporting activities. The Montes de Málaga Natural Park is very close to the capital

of the Costa del Sol, and can be said to be a true green lung for the city. This park, which is part of the central-western area of the Betic mountain range, sits on a medium-mountain area with gentle relief, crossed by small valleys and home to with large pine forests (Diputación Provincial de Málaga, n.d.b). This natural park has five signposted walking routes and two cycling routes. Both sports can be considered as the main ones in this study area.

According to the surveys, 80% of the people who engaged in sport in this natural area were men and 20% women, aged between 40–60 years (80%) and between 15–40 years (20%) (**Figure 10**). Consequently, cycling (80%) and hiking (20%) are the only sports in the area according to the survey.

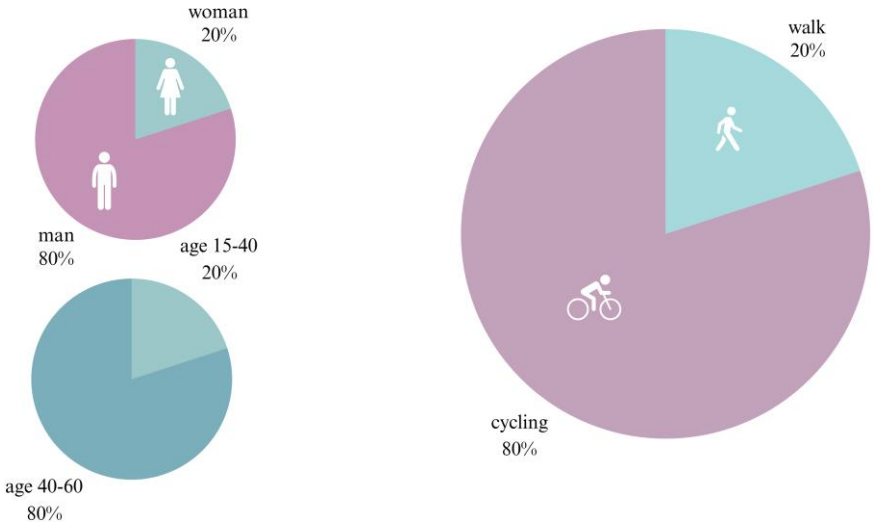


**Figure 10.** Gender, age and most frequent sporting activity of the people who answered the survey in the Montes de Málaga area.
Source: authors.

When asked what improvements they would like to see in this area, the most requested indicator was improving the feeling of safety (50%), followed by improving accessibility (16.7%), increasing the number of rest areas (16.7%) and better lighting (16.7%) (**Figure 11**).

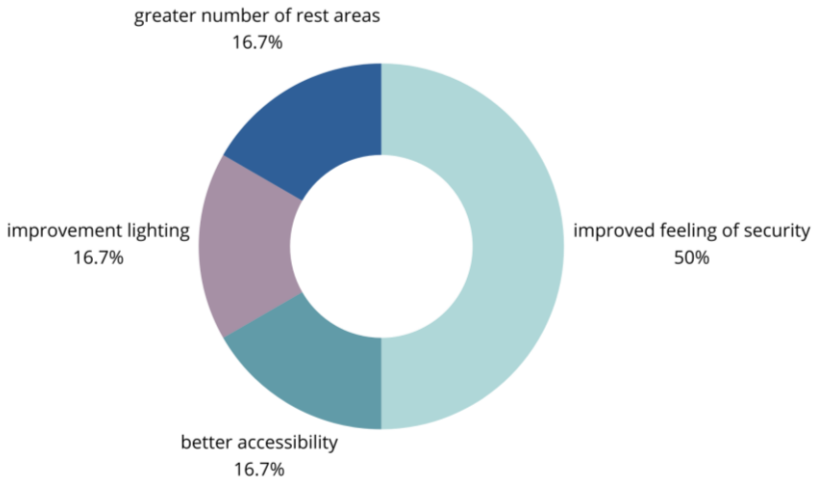


**Figure 11.** Citizen demands in the Montes de Málaga area.
Source: authors.

In terms of the results obtained, the linearity of Malaga's coastline, its total length and the city's pleasant climate have made it a favourable environment for outdoor sports. The coastline is the area of the city where the greatest number of informal outdoor physical activities take place and where a greater variety of activities have been identified. The greatest calls for improvement in the public space are for more in sport equipment and better urban paving; this is different to the other two study areas, where the land has a more natural surface and the asphalt in this case requires continuous maintenance.

The Montes de Málaga natural park—an inland natural environment—has a low diversity in terms of the type of physical and sporting activities carried out by citizens. As this is one of the most important natural areas in Malaga and one of the closest to the urban area, it would be important to promote other types of sporting activity in this natural area, which could generate physical benefits for the health of citizens.

In terms of the degree of naturalness, the coast is the natural environment whose surface has been most affected by human action, compared to the estuary of the Guadalhorce or the Montes de Málaga, which are much more natural environments and not so close to an urban space. This is reflected in the results of the surveys, which prioritise measures, in the case of the promenade aimed at specific improvements to facilities and paving. On the other hand, many of the requests in the more natural areas relate to safety, lighting and accessibility.

Specifically, the importance of adequate lighting is highlighted in the Guadalhorce estuary and the Montes de Málaga. This aspect is linked to safety in natural areas. These vast areas are away from the urban centre and there is little lighting. Another important factor is the improvement of accessibility to natural areas. An intervention that respects the natural environment can encourage physical and sporting activities, especially for older people, thus promoting active ageing.

## 4. Conclusions

Numerous previous studies have established the direct relationship between natural spaces, physical activity and its health benefits. Public administrations should be aware of this fact and encourage good management of the city's natural spaces to promote the idea of an active and healthy city.

This research has analysed the relationship between the local communities and the green spaces of the coastal city of Malaga in terms of physical activity. Carrying out the study in this city has made it possible to analyse physical activity from the point of view of a coastal city with a wide coastline due to its demographic growth, as well as studying an inland natural environment just a few kilometres from the sea. The opinions of users were collected regarding how the natural spaces studied could be improved for physical exercise. All this qualitative information is useful to guide future interventions by the local government. The proposed innovative methodology combines the use of qualitative research techniques: with the creation of a collaborative map or webGIS digital platform design that fosters citizen participation, along with the survey work conducted with people who engage in physical activity in the city's public space.

This research highlights the importance of establishing citizen criteria for physical activity and sport in natural environments, as well as the main demands expressed. This is undoubtedly valuable information as a starting point for the design and management of public natural spaces as a way of promoting physical activity and, consequently, healthy habits.

Organising meetings with the local government to present the results of the research would also be of interest. As a future line of research, the existing sport facilities in these natural spaces and their needs could be analysed in greater depth. It is proposed to analyse each study area through the use of mapping, geolocation of sporting activities and existing facilities.

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