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PERSPECTIVE

Sport and Geography: Exploring their Mutual Influence on Geographical Dynamics

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Abstract

Sport and geography are intrinsically connected, influencing and shaping each other bidirectionally. Drawing on interdisciplinary perspectives, this narrative review examined how natural geographical factors —such as terrain, climate, and elevation— affect sport participation and athletic performance. It also explored the role of human-made geographical features, including sport stadiums, arenas, and facilities, in developing sport organisations and fostering community development at various scales. The review further investigated how sport, as a global industry, transforms geographical landscapes, reflecting and reinforcing political, economic, and cultural power dynamics. The analysis of major sporting events demonstrated their profound impact on host cities and regions, including urban development, infrastructure projects, and environmental changes. The paper concluded by emphasising the significance of this reciprocal relationship between sport and geography, highlighting the potential to develop sustainable programmes and policies that enhance collective well-being and encourage collaborative approaches between the two fields.

Keywords:
good health and well-being, sustainable cities and communities, responsible consumption and production, climate action, partnership for goals

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Introduction

The convergence of sport and geography unveils a dynamic interplay that influences both the physical landscape and the cultural fabric of societies worldwide. Sport refers to participation in activities involving physical exertion and skill, often in a competitive context, regulated by a set of rules or customs (Oxford English Dictionary, n.d.). On the other hand, geography is broadly understood as the study of the earth's surface and the spaces inhabited by human populations, focusing on the complex relationships between people and their surroundings (Tran et al., 2017). Both sport and geography fundamentally centre on interactions between the environment and human activity, highlighting the importance of spatial and physical elements in shaping human experiences. Since the seminal work of Burley in 1966, the recognition of sport geography as a subject of academic inquiry has grown, acknowledging its economic, social, and cultural significance, as well as its impact on urban land use. This acknowledgement marks the genesis of a new

paradigm, where the study of sport emerged as a distinct and increasingly relevant field within geography (Wise & Kohe, 2018).

Over time, sport geography has evolved into a comprehensive subject matter that integrates geographical concepts such as space and place with studying sport phenomena. Understanding the importance of space and place is crucial in defining sport and gaining a better appreciation of its significance. Even though sport geography has a long history originating in the late 1800s and early 1900s, it was officially acknowledged only recently, as evidenced in scholarly works such as the Dictionary of Human Geography (Rogers et al., 2013). The emergence of the cultural turn in applied human geography further propelled the development of critical studies within sport geography, focusing on issues of race, gender, class, and spatial dynamics (Gaffney, 2013a). Indeed, sport is inherently geographic, as games and competitions unfold within specific locations bounded by space and time. Understanding the geographical dimensions of sport provides valuable insights into how human activities intersect with the natural and built environment, shaping landscapes, communities, and cultural identities.

Sport as an Inherently Geographic Phenomenon

Sport is inherently geographic as it occurs in specific spaces, each with unique spatial configurations, environmental conditions, and social meanings that shape the nature of sport activities. Moreover, sport activities influence and are influenced by geographic contexts, as they foster connections to local culture, alter land use, and drive economic and social dynamics within their surrounding environments. Several key concepts illustrate this claim:

Place

Sport events are rooted in specific locations that hold cultural and social significance, embedding sport deeply within local identity (Lee et al., 2016). A city's identity might be closely tied to its local sport teams, where team symbols, colours, and histories become part of its collective memory and pride, fostering a shared sense of belonging among its residents. Iconic sport venues, such as stadiums and arenas, transcend their function as physical sites for competition; they become landmarks that attract tourism, support local businesses, and serve as gathering spaces, contributing to the city's landscape and reinforcing its identity as a "home" for both residents and fans alike (Bale, 2003).

Space

The spatial arrangement of sport facilities plays a significant role in shaping urban landscapes, as the placement and design of these structures affect multiple aspects of city life. For instance, large stadiums and arenas in urban centres can increase traffic congestion on event days, necessitating specific traffic management and public transportation adjustments to accommodate high visitor volumes. Furthermore, these facilities stimulate economic activity in surrounding areas, attracting businesses such as restaurants and community events, which can influence the development of neighbourhoods (Shen et al., 2020).

Environment

The natural environment fundamentally determines the types of sport that can be played in a given region, as geographical features create unique opportunities and limitations for recreational activities (Hall & Page, 2014; McCullough, 2023). For instance, the elevation and terrain in mountainous areas might favour winter sport like skiing and snowboarding. At the same time, trails and natural obstacles attract hiking and climbing, making these sport central to the region's culture and economy. Similarly, coastal areas provide natural settings for water sport such as surfing, sailing and beach

volleyball. The local climate and weather patterns further define when these activities are ideally pursued, leading to seasonal tourism peaks and shaping the infrastructures around these natural assets (Hallmann & Feiler, 2014).

Understanding these geographical dimensions of sport provides valuable insights into how human activities intersect with the natural and built environment, shaping landscapes, communities, and cultural identities. By examining these aspects, sport geography provides a comprehensive understanding of the complex interplay between sport and geography, highlighting the significance of spatial and environmental factors in shaping sport and their broader social and cultural implications. This narrative review explored the reciprocal relationship between sport and geography to reveal how they mutually influence each other and shape geographical dynamics. Through an interdisciplinary analysis, it aimed to uncover the intricate dynamics that define this interplay. By delving deep into the complex interactions between sport and geography, it sought to shed light on the diverse manifestations of their intersection and their profound impact on the world we inhabit.

Theoretical Perspectives

This review drew on several theories to articulate the intersection of sport and geography and its significance to knowledge generation. These theoretical frameworks provide a multidimensional understanding of how sports and geography mutually influence one another, offering valuable perspectives for interdisciplinary research and policy-making.

Spatial Theory

This theory offers a lens for analysing how spaces are created, experienced and understood (Mazúr, E., & Urbánek, 1983). From the sport geography perspective, the spatial theory helps illuminate the physical arrangement of sport facilities, from local gyms to international stadiums, revealing how these structures are strategically placed to meet the community's needs, enhance accessibility, or signify status and investment in sport culture. Furthermore, spatial theory sheds light on the distribution and availability of sporting activities, highlighting patterns of inclusion or exclusion, as well as examining how individuals and communities engage with sport spaces, from local enthusiasts and fans, shaping a shared place and belonging through their regular participation and presence (Davies, 2016; Salimi, 2024; Kinkaid, 2020).

Place Theory

Place theory focuses on the social and cultural importance of specific locations, examining how meaning and identities are formed through human experiences and activities within those spaces (Cresswell, 2014). This theory provides the lens for understanding how particular locations gain significance through sport, how sport, in turn, contributes to place-making, and how the identity of such locations relates to sporting functions. Through place-making processes, sport can turn a stadium, park, or even a neighbourhood into a site of shared identity and pride as fans, athletes, and communities ascribe collective memories, traditions, and emotional connections to these spaces, intertwining the physical landscape with the cultural identity and history of the region (Geffroy, 2016; McClinchey, 2022; Perkins & Thorns, 2017).

Human-Environment Interaction

This perspective centres on the interdependence between humans and their surroundings, recognising how each influences and shapes the other over time (Moran & Brondízio, 2012). In sport geography, this approach is valuable for understanding how the natural environment and climate conditions dictate the types of

sport commonly practised in a region, such as mountain sport in alpine areas or surfing in coastal zones, thereby highlighting the environment's role in shaping the sporting scenario (McCullough, 2023). Additionally, it allows for analysis of the effect of sport on the environment, such as erosion from hiking trails or ecological disruption from large sport facilities, and conversely, how environmental changes—like climate shifts or land degradation—affect the viability and seasonality of sport, as well as the changes in the environment and its effects on the sport, prompting adaptations in sporting practices and policies (Dong, 2018; De Oca, 2018; Dai & Menhas, 2020)

Cultural Geography

Cultural geography deals with how culture, in terms of practice and belief, is situated in space (Anderson, 2021). In sport geography, this framework is especially helpful in understanding how sport mirror or produce cultural identities and social norms, revealing how athletic practices and preferences can serve as symbols of local and national identity, pride and heritage. It also provides insight into how cultural beliefs impact who participates in sport and under what conditions, as well as how sport events, rituals, and icons manifest and propagate cultural ideals, creating spaces where shared values are celebrated and social identities are reinforced (Anderson, 2021; Ramshaw, 2019; Stronach et al., 2016; Tomić, 2023).

Critical Geography

Critical geography explores the tensions and relations of power operating in geographical formations and inequalities (Koch, 2016). In sport geography, this perspective allows the examination of how accessibility, inclusion and fairness are negotiated in sport and sport spaces and how these will support and contest structures of power and inequality. By looking into issues such as the distribution of sport resources, the design of inclusive or exclusive spaces, and the representation of different groups within sporting cultures, critical geography exposes how sport both reflect and influence broader social inequalities while also highlighting potential avenues for change that promote equity and social justice in sport participation and infrastructure (Darnell & Millington, 2020; Neal et al., 2024; Swope et al., 2022).

These theoretical perspectives guided the review's comprehensive approach to understanding the complex relationship between sport and geography. Spatial theory facilitated the analysis of the physical arrangement of sport venues, while place theory emphasises these spaces' cultural and social significance. Human-environment interaction offered insights into the reciprocal influence between natural landscapes and sport practices, illustrating how geography shapes sport and vice versa. Cultural geography enriched the discussion by exploring how sport reflects cultural values and contributes to identity formation. Finally, critical geography provided a framework for examining issues of power and equity within sport spaces. By integrating these frameworks, the review aimed to develop a multidimensional understanding of how sport and geography intersect, shaping physical, social, and cultural landscapes, with each perspective offering unique contributions without conflicting with one another.

Significance to Knowledge Generation

Exploring the mutual influence of sport and geography through an interdisciplinary lens provides invaluable insights into how these fields interact to shape both physical and cultural landscapes. Each approach offers a unique perspective on how sport impacts urban planning, cultural identity, social dynamics, and environmental sustainability. This section discusses the various interdisciplinary approaches contributing to knowledge generation in sport and geography studies.

Geographic Spatial Analysis

The accomplishment of geographic spatial analysis is cardinal in inspecting the establishment and accessibility of sport facilities since they are involved in community captivation and urban development (Asefi & Nosrati, 2020). It allows us to see a specific relationship between sport venues' spatial patterns and the positioning of local and regional identity, together with resource distribution for social cohesion in the context of urban and rural environments (Bale, 2003). By identifying where sport facilities are located as part of integrated city planning, this approach can identify trends that enable or hinder community engagement in sport, thus guiding policy in achieving egalitarian access to sport resources (Salarvandian et al., 2020; Yang et al., 2023).

Environmental Sustainability Perspective

The environmental sustainability perspective is another vital lens in the management of sport organisations, particularly in addressing the ecological effects of sport events and structures in realising sustainable goals (Collins & Roberts, 2017). Large-scale sport events (LSSEs) and large sport venues (LSVs) create substantial environmental impacts due to the resources they consume, the wastes they generate, and the ecosystem alterations they cause in host locations (Banks-Leite et al., 2012; Cerezo-Esteve et al., 2022; Kellison & Casper, 2017). In response, the United Nations Environment Programme (UNEP, 2018) called for a shift towards sustainability in sport, including waste reduction. This guidance underscores the importance of sustainable sport development in managing and mitigating adverse effects on the local and international environment.

Economic and Tourism Analysis

Sport is usually viewed as an investment with the potential to generate significant returns for local and national revenues through tourism and event sponsorship. To capitalise on this, authorities often propose hosting major international sport events to achieve economic growth and renewal, as such events attract substantial investments (Graham et al., 2021; Shen et al., 2020). Economics plays a crucial role in assessing the value of sport-related activities, including tourism, infrastructural development, and employment opportunities (Getz & Page, 2016; Giampiccoli et al., 2015). This approach also evaluates the broader economic benefits and costs by considering sport's social and environmental impacts (Geeraert, 2016; Chersulich Tomino et al., 2020). By understanding these potential advantages and drawbacks, communities can strategically leverage sport to boost economic development and effectively prioritise using available resources.

Social and Political Context

This view examines the social and political organisation of sport, focusing on issues of accessibility and participation and exploring questions on who has the right to engage in sporting activities and the underlying reasons. It highlights how sport can serve as a platform for addressing social issues, such as allocating resources and opportunities for participation in sport based on geographical and socioeconomic context (Bergsgard, 2018; Spaaij & Jeanes 2013). By recognising how sport spaces mirror or contest existing power relations in society, this approach underscores the need for bias-free policies to support equal rights and opportunities for diverse groups to participate in sport (Silva, 2018).

Historical Context

The historical approach investigates how sport and geography have transformed throughout history, helping experts comprehend how past events, cultural contexts and geographical factors have affected sport practices. It emphasises how historical developments influence present sport trends and predicts future directions

(Koenigstorfer et al., 2019; Moyle et al., 2018). This approach is particularly valuable for scholars as it allows them to locate contemporary sport practices within specific socio-spatial constellations, enabling unique or alternative perspectives on the development of modern sport (Krüger, 2015; Nauright & Zipp, 2018)

Synthesis of Perspectives and Approaches

The integration of these theoretical and analytical frameworks affirms sport as a dynamic force that shapes and is shaped by geography. Sportscapes are simultaneously physical and symbolic, functioning as arenas for human performance, interaction, cultural expression and socioeconomic development. The legitimate intersection of sport and geography lies in its ability to respond to complex inquiries about space, identity, power, and sustainability. By synthesising spatial theory, place theory, human-environment interaction, cultural geography, and critical geography with interdisciplinary analytical approaches of geographic spatial analysis, environmental sustainability perspective, economic and tourism analysis, social and political context, and historical context, the study of sport becomes a holistic inquiry into how societies are organised, how they interact with their environments, and how they envision and shape their futures. This intersection underscores sport's relevance as a transformative and integrative force within the broader human experience.

Influence of Geographical Factors on Sport Events

In this section, the paper explores how specific geographical factors of weather and topography impact sport and their cultural context. Participation in sport requires a suitable setting and adequate space. Athletic performance is affected by both internal factors, such as skill level, and external factors, including the surrounding physical environment. Factors such as temperature, pollution, altitude, and wind can influence athletic performance. Additionally, geographical factors and the geographical environment play a critical role in shaping all aspects of sport participation, whether through physical, cultural, social, or geopolitical factors. These geographical aspects collectively form the context of sport, impacting it positively or negatively.

Weather and Climatic Factors

Weather and climate significantly impact sport performance and the cultural context of sport activities. Keys climatic elements, such as temperature, humidity, air pressure, wind direction and speed, and precipitation, shape the conditions under which sport is practised and competed (Brocherie et al., 2015; Wagner et al., 2019). The performance of both recreational and competitive athletes is closely tied to these environmental conditions (Casa et al., 2015; Gatterer et al., 2021; Segreti et al., 2024). High temperatures can lead to heat-related illnesses such as muscle cramps and heat stroke, while excessively low temperatures may cause hypothermia. Climatic variations also influence the development of distinct sport cultures, such as the prevalence of ice sport in cold climatic areas like the Arctic region.

Sport participants in tropical regions, on the other hand, benefit from the warm weather and extended daylight hours, enabling them to engage in activities like the long jump, surfing, swimming, beach volleyball, and outdoor tennis, which are well-suited to these conditions. However, weather and climate significantly influence athletic performance, as they affect an athlete's neuromuscular strength and aerobic metabolism, both of which vary seasonally. Weather conditions are unpredictable and constantly changing, often creating challenges for sport participation. Abrupt shifts in weather can disrupt human activities, including sport. Excessive heat, extreme cold, or rainy weather can hinder physical exercise,

making outdoor sport difficult or even impossible (Casa et al., 2015). These conditions can also affect indoor sport, underscoring the pervasive impact of weather on sport activities. Moreover, climate variations can affect not only physical capabilities but also athletes' mental and emotional well-being (Mental Health Foundation, 2023). Overall, weather and climate play a pivotal role in shaping the feasibility and effectiveness of sport activities.

Temperature

The importance of eco-climatic and geo-climatic conditions in determining the thermal comfort of athletes cannot be overstated. Athletes must operate within their thermal comfort zone to achieve optimal performance (Fantozzi & Lamberti, 2019; Gibson et al., 2019; Revel & Arnesano, 2014). Temperature significantly influences athletes' physiological responses and performance capabilities, affecting the body's fluid balance and cardiovascular system. Extreme temperatures, whether high or low, pose serious health risks to athletes and can impact their ability to perform effectively (Casa et al., 2015).

Athletes are vulnerable to dehydration and heat-related illnesses like heat cramps and heatstroke in hot weather. Dehydration may cause athletes to have higher heart and breathing rates, affecting their endurance and stamina. On the other hand, in chilly temperatures, muscles might react sluggishly because of vasoconstriction, leading to decreased flexibility and coordination. Taking temperature conditions into account is crucial for athletes and sport organisers in the preparation and execution of sport events. Adequate hydration, getting accustomed to the climate, and dressing in protective clothing are essential ways to minimise the negative impacts of extreme temperatures on athletes' performance and health (Gibson et al., 2020; Périard et al., 2021).

Precipitation

The intensity, duration, and timing of precipitation impact sport and the nature of sporting events. Regarding outdoor sport, precipitation imposes many challenges because they are played on open fields or grounds. Slippery and unpredictable conditions created by rain or snow affect the athletes' ability to maintain traction and proper footing. The risk of slips, falls, and injuries is prominent in soccer, football, or rugby (Day et al., 2021; Della Villa et al., 2020).

Heavy rain or snowfall can impair visibility and hinder athletes from performing at their best. Prolonged exposure to precipitation can also lead to discomfort and reduced concentration, further impacting sport performance (Alhadad et al., 2019; Allen-Collinson & Jennings, 2019). In sport where equipment is used, such as tennis or baseball, precipitation can affect the grip and handling of equipment, resulting in errors and mishaps during play. For instance, wet tennis courts or baseball fields can cause balls to skid or bounce unpredictably, altering the game's outcome.

Wind

While it is often assumed that wind does not significantly affect outcomes because all athletes compete under similar circumstances, this is not entirely true for sports like golf. In golf, strong winds can considerably affect the trajectory and distance of the ball, thus influencing performance and scores. Although all competitors may face the same windy conditions, the variability in gusts and directional shifts can create uneven challenges. These fluctuations can influence shot accuracy, club selection, and course strategy, leading to unpredictable outcomes and potentially impacting players differently throughout the tournament (Jowett & Phillips, 2023; Malik & Saha, 2021).

The wind's force can also affect the durations, lengths, and altitudes of athletic

performances, particularly in track and field events like sprinting, long jump, high jump, and throwing sports such as javelin and discus (Alam et al., 2019; Moinat et al., 2018). For a performance to be eligible for record consideration, the wind speed must not exceed two meters per second, as specified by the International Association of Athletics Federations (IAAF, 2018). Any record will not be officially acknowledged if the wind speed goes above 2m/s, regardless of the distance, time, or height reached. In long-distance races, runners run on a circular track, which helps to neutralise the effects of wind, making it an exception to the usual rules. Wind plays an active role in athletic performances such as sprinting, jumping, and throwing events. As are time, distance, and height-related issues in any sport, wind speed and direction are crucial in athletic performance.

The IAAF (2018) has established regulations concerning wind speeds to promote fairness in competition. To be deemed valid under these rules, sprinting, jumping, and throwing events must have a wind speed of less than two meters per second (2m/s) for record-keeping purposes. If the wind speed surpasses this limit, any record achieved in terms of time, distance, or height will not be recognised. These rules are designed to lessen the impact of different wind conditions on athletes' performance. A powerful tailwind can give athletes a push, leading to quicker times or longer distances, whereas a headwind can impede their advancement. The IAAF aims to uphold fairness and consistency in athletic performances by limiting wind speed.

It should be noted that these regulations do not apply to long-distance running events. This happens because athletes usually race on circular tracks, which help distribute the impact of wind evenly throughout the competition. Nevertheless, the wind can still affect the tactics and strategies of competitors in these events. Overall, wind is a critical factor that athletes and coaches must consider when preparing for competitions. It can significantly impact performance outcomes and the validity of records in certain athletic events, highlighting the importance of understanding and managing its effects.

Topographic Factors

The impact of topography on sport is multifaceted and significant, influencing the types of sport that emerge in specific regions and the skill sets athletes require to excel (Yang & Duan, 2024). The natural landscape of an area often dictates the physical activities that are feasible and practical. For instance, regions with high cliffs and mountains are ideal for rock climbing, mountain climbing, and abseiling. Athletes residing in these regions have convenient access to appropriate training facilities, enabling them to improve their abilities in these sports (Song & Zhang, 2018; Zhang, 2024).

Topography also affects the nature of sport fields and infrastructure. Sport fields are often designed with a slope to facilitate drainage by directing water toward the edges, where it can be gathered and removed through natural or man-made drainage systems. Adequate drainage is essential for maintaining the usability of sport fields. Different sports require distinct slope setups to optimise performance and safety. Additionally, terrain slopes influence athletic performance, with uphill areas demanding more energy from athletes, while downhill slopes reduce the energy required.

The topography of a region can also shape its climate and weather patterns, which, in turn, affect the types of sports that are popular or feasible. Flat terrains and mild climates, for example, are ideal for outdoor activities like running, cycling, and horse riding, offering ample space and favourable weather conditions. Similarly, with their vast stretches of shoreline, coastal areas foster a

culture centred on water-based activities such as swimming, surfing, sailing, and fishing. These geographical conditions drive strong cultural preference for specific sports (Liu et al., 2020; Ounanian et al., 2021; Wang & Chen, 2020).

In mountainous regions, large trail networks or ski resorts attract enthusiasts of hiking, trail running, skiing, and snowboarding. Likewise, areas with established water systems or ocean borders support activities such as rowing, kayaking, and beach volleyball. Varied topography across regions offers unique challenges and experiences for athletes, influencing sport preferences and culture. Rugged terrains and cliffs draw rock climbers and mountaineers, while flat open lands attract runners and cyclists. Ultimately, topography plays a vital role in shaping sport culture by dictating the types of sports practised, the physical and technical demands on athletes, and the cultural traditions surrounding sport in different regions.

Altitude

Altitude is one of the most significant aspects of topography in relation to sport and demands closer attention. It affects the topography of a region, influencing various physical and environmental characteristics, including the shape and height of landforms, climate, vegetation, and human activity. These factors, in turn, affect athletic performance, especially in sports that rely on aerobic energy systems. The availability of oxygen and atmospheric pressure directly impacts athletic performance. At higher altitudes, the partial pressure of oxygen (pO2) decreases, with levels dropping from 159 mm Hg at sea level to 125 mm Hg at 2000 meters above sea level. This creates a low-pressure, low-oxygen environment, reducing oxygen delivery to tissues and limiting the oxygen supply to working muscles (Kenny et al., 2019; Martin et al., 2015; Wilmore et al., 2019). Consequently, athletes may experience decreased exercise capacity, earlier onset of fatigue, and reduced endurance performance (Ramchandani et al., 2024).

Altitude also affects athletes' physiology and ability to execute technical moves (Chapman et al., 2013). For example, the reduced air density at higher elevations results in lower drag and lift forces on a ball, allowing it to travel at longer distances with less curve. These changes can influence an athlete's ability to perform techniques, such as reacting to incoming balls or adjusting to altered trajectories (Dykiert et al., 2010). The impact of altitude varies depending on the type of physical activity. Endurance sports, such as long-distance running, cycling, and cross-country skiing, are significantly affected due to their high reliance on aerobic energy systems.

In contrast, anaerobic sports like sprinting and weightlifting are less impacted because they primarily depend on non-oxygen-dependent energy systems. Altitude poses both challenges and opportunities for athletes. While reduced oxygen availability can hinder performance, it also offers potential advantages for training adaptations. Understanding the physiological effects of altitude and employing appropriate training and acclimatisation strategies are essential for optimising performance at varying elevations.

The Effect of Sport on Geography

The previous section analysed how various geographical factors influence sport. In this section, the paper shifts focus to how sport shapes the spatial and human aspects of geography, providing a thorough discussion of the interactive relationship between the two. In particular, it highlights how sport shapes cultural and social geography, landscapes, urban planning, global and political economy, migration and tourism.

Sport emerged as a significant focal point within geography due to its increasing human, economic, and environmental significance. Once regarded merely as leisure activities, sport now holds considerable importance across economic, commercial, political, and environmental spheres. Although traditionally not linked to geographic studies, sport has gained credibility within the field as a subject of social research. This legitimacy stems from sport's relevance in addressing various societal issues and geography's ability to enhance understanding of sport-related phenomena. The widespread popularity of the sport and its diverse geographical representations reflect vital aspects of social structures and hierarchies, offering valuable potential research areas. Sport is no longer peripheral to society but plays a central role in daily life, often mirroring prevailing social and political issues (Woods & Butler, 2020). Moreover, sport has become a vital institution for transmitting cultural traits, serving as a prominent and widespread social system in modern society.

Sport is closely linked to geography through its environmental impact, including the construction of stadiums, golf courses, and other sport facilities. These activities influence local and global landscapes, showcasing sport's interaction with the physical environment. Additionally, sport is intricately tied to the global political economy and international relations, reflecting broader social and economic dynamics (Al-Dulami et al., 2024; Black & Hibbeln, 2018; Dichter & Johns, 2014).

Effects of Sport on Cultural Geography

In cultural geography, sport is viewed as a source of cultural symbols and expressions of identity. It shapes cultural landscapes and influences the diffusion of values, traditions, and lifestyles across different geographic contexts. The following discussion elaborates on some of these dynamics.

Cultural symbols

Sport serves as a powerful symbol of identity, reflecting and reinforcing regional, national, and local pride. Through shared experiences and collective representation, sport unites individuals and communities, creating a sense of belonging and shared purpose. Sport teams often represent specific communities or regions, with their logos, colours, and mascots becoming iconic symbols of pride and unity. For instance, the Green Bay Packers in the United States are deeply rooted in the identity of Green Bay, Wisconsin, with their community-owned structure and iconic green-and-gold colours symbolising local pride (Richards, 2021). Similarly, football clubs like FC Barcelona represent not just a city but also a broader cultural identity, including Catalan pride and independence (Juventeny Berdún, 2017). These symbols transcend sport, influencing art, music, and even political movements.

On a national scale, sport can act as a unifying force and a source of international recognition. For example, cricket is central to India's national identity, symbolising a shared cultural experience across a vast and diverse population. The Indian Premier League (IPL) has further elevated cricket's role in the country's cultural fabric, bringing together regional loyalties under a national spotlight (Anuranj & Sircar, 2024). Similarly, rugby in New Zealand is more than just a sport; the All Blacks team represents the nation's values, history, and indigenous Maori culture, with the haka (traditional Maori war dance) becoming an iconic pre-game ritual known worldwide (Jackson & Sturm, 2021).

Expressing Identity

Participation in and support for sport is a profound expression of cultural identity, enabling individuals and communities to celebrate, preserve, and share their heritage. Traditional sport and indigenous games, in particular, are deeply rooted in cultural

practices, often passed down through generations as a way to maintain cultural continuity and foster community cohesion (Maguire, 2011). For instance, the Maasai people of East Africa incorporate spear-throwing and high jumping into their cultural events, activities that are not only demonstrations of physical skill but also tied to rites of passage and traditional ceremonies. High jumping, in particular, is showcased during the Adumu dance, which is performed as part of initiation rituals, symbolising strength and readiness for adulthood (Burnett, 2018). The Highland Games of Scotland showcase traditional activities such as caber tossing and hammer throwing. These events celebrate Scottish heritage and draw global attention to the country's history and traditions. The games have become a significant tourist attraction, blending local pride with international participation (Bowness, 2020).

Cultural Landscapes

Sport infrastructure and facilities, such as stadiums, arenas, and sport fields, play a vital role in shaping the cultural landscape of a place. These spaces often serve as hubs for social gatherings, community events, and recreational activities, influencing the visual and experiential character of both urban and rural environments (Kellison & Hong, 2015; Thomson et al., 2018). An excellent example is the Maracanã Stadium, an iconic representation of the cultural landscape of Rio de Janeiro and Brazil as a whole. Constructed in 1950 to host the FIFA World Cup, the Maracanã is commonly recognised as the largest football stadium in South America and a historical landmark. With the largest seating capacities in the world, the stadium has staged some of the biggest soccer matches, concerts, and other public events to become part of Rio's identity and a source of pride for the Brazilian nation. Through its architecture and its role as the focal point for significant events, the Maracanã illustrates how sport infrastructure contributes to the cultural and emotional mapping of Brazilian society. It also embodies Brazilians' deep appreciation for soccer and sport, reflecting broader global practices and values associated with sport infrastructure (Brown & Lanci, 2016).

Diffusion of Values and Traditions

The diffusion of values and traditions through sport is based on the premise that sport serves as a carrier of culture, allowing norms, values, and customs to spread across regions and nations. Sport is not merely a form of physical activity; it also encompasses broader cultural elements, representing any human activity performed on various levels and crossing national borders. Values such as team spirit, sportsmanship, determination, and respect for rivals are transmitted worldwide through international media coverage, popular sport, and the influence of prominent athletes. These elements foster cultural convergence, enabling diverse groups to share common values and feel connected as part of a larger global community (Girardin et al., 2020). A prominent example is the Olympic Games, which embody and promote ideals of good sportsmanship, fair play, and international cooperation. By showcasing these values, the Games influence attitudes and behaviours worldwide, reinforcing the role of sport as a unifying cultural force (Gary & Rubin, 2016).

Lifestyle and Leisure Practices

Whether experienced as an athlete or spectator, sport significantly influence people's choices in life and leisure. It shapes daily organisational patterns, peer associations, and activities, embedding itself in the temporal structure of people's lives, relationships, and even their self- and collective identities. The formal, controlled, and institutionalised nature of competitive sport contrasts with the informal and free-flowing approach to recreational activities. Both, however, align closely with the broader

lifestyle-related practices and social dynamics that have become increasingly important in the sociology and psychology of sport (Coakley, 2015).

As a cultural institution, sport is one of society's most important creations, bringing together participants and spectators from diverse regions of the world. This interaction fosters cultural assimilation and diffusion, strengthening connections across different groups (Ciomag & Pop, 2024). Sport tourism, in particular, can enhance a country's heritage, identity, and sense of community (Ramshaw, 2014). It allows residents to showcase their culture while allowing visitors to engage with local traditions and customs. Moreover, sport tourism often drives the development of new sport-related infrastructure, enhancing both local and international engagement (Pioletti, 2017).

Sport is deeply intertwined with cultural geography, serving as a dynamic expression of identity, values, and traditions. By examining its cultural dimensions, geographers gain valuable insights into how sport shapes culture and how cultural landscapes and societal identities influence sport. This mutual interaction highlights sport's pivotal role in reflecting and shaping the cultural fabric of societies worldwide.

Effects of Sport on Social Geography

Sport serves as a mirror, reflecting the broader dynamics of society. It is often seen as a one-way relationship, where sport primarily mirrors societal changes in technology, social dynamics, ideas, and trends rather than actively shaping or interacting with society in significant ways. Sport, however, also plays a socially cohesive role by bringing people together from diverse backgrounds, including different regions, social classes, ethnic groups, and religions (Mier & Fletcher, 2019). Additionally, sport facilitates universal social mobility, exemplified through the achievements of transnational athletes or teams who transcend barriers and inspire broader societal change (Taylor, 2024).

Social Cohesion

Sport is a powerful force for social cohesion, bringing together individuals from diverse social, economic, and cultural backgrounds. This unifying effect is one of sport's most profound societal contributions, fostering a shared sense of identity, belonging, and community. By creating environments where differences are set aside in favour of common goals or passions, sport helps forge connections that transcend individual backgrounds, promoting inclusivity and collective identity (Anderson-Butcher, 2019).

Local sports leagues often bring communities together at an amateur or grassroots level. For instance, community soccer leagues in diverse urban neighbourhoods can foster relationships among families who might not otherwise interact (Kim et al., 2020). These shared experiences promote understanding, break down stereotypes, and strengthen the fabric of the community. Beyond participation, the communal experience of supporting teams, attending events, and celebrating achievements also strengthens social bonds. For example, during global events like the FIFA World Cup or the Olympic Games, millions of people unite behind their national teams, setting aside regional, ethnic, or class differences to rally around a shared identity. Fans gathering in public places to watch matches, wearing team colours, and celebrating victories together exemplify how sport can create a sense of solidarity and pride.

Sport has also proven to be an effective tool for integrating marginalised groups into society. For instance, programmes for refugees and immigrants often use sport as a means of social integration, helping newcomers connect with their host communities (Ponciano Núñez & Portela-Pino, 2024). Organisations like *Fútbol Más* use soccer to promote

resilience and inclusion in vulnerable populations, encouraging social interaction and community-building.

Spatial Organisation

The spatial organisation of sport facilities, including stadiums, arenas, and fields, profoundly influences neighbourhood development by serving as central hubs for social gatherings and recreational activities. These venues attract people for sport events, concerts, and other community gatherings, fostering social cohesion and creating shared experiences among residents. Such sport places often stimulate economic growth, with nearby businesses like restaurants, retail stores, and hotels benefiting from increased foot traffic during events (Abbiasov & Sedov, 2022). Facilities like Baltimore's Camden Yards have revitalised surrounding areas, attracting investment and reshaping the urban landscape by drawing both local visitors and tourists. Additionally, sport facilities influence urban planning decisions, such as transit access and pedestrian zones, to manage the influx of people on event days, thereby integrating these spaces into the broader city infrastructure. This integration not only enhances accessibility but also contributes to neighbourhood identity, as iconic sport venues become symbols of local pride and heritage, solidifying their role as landmarks within the community (Graham et al., 2021; Shen et al., 2020).

Identity and Pride

Individuals show great passion towards sport because they constitute an integral part of a cultural identity and a source of regional or national pride. Every time athletes or teams achieve victories at a national or international level, the morale of the whole region is boosted, as these successes are considered a testament to the community's collective strength and capability. Sport achievements extend beyond mere regional identification; they can reinvigorate cultural unity and promote the region to its residents and the broader world. Celebrations, such as public gatherings, parades, and media coverage, often feature these victories, fostering social cohesion and a sense of togetherness (Andersen, 2021). In this way, sport triumphs become symbolic, not merely showcasing athletic superiority but allowing the sport to function as a cultural artefact that sustains a shared memory. This memory supports and reinforces social bonds by connecting participants to a perceived collective identity - the self-constructed regional identity of the people.

Social Capital

A critical function of sport is to create cooperation and trust networks across communities and other related groups (Skinner et al., 2018). Participating in sport can teach people how to relate with others, collaborate, and show mutual respect—skills that are fundamental not only in social relationships but also in professional and business contexts. In team sport, players rely on one another to achieve shared objectives. This reliance requires a willingness to follow instructions, share responsibilities, and work collectively toward success. Such dynamics promote interpersonal relationships centred on collective goals, helping individual players navigate both success and failure as a unified team. For instance, soccer fosters confidence and mutual support among teammates, creating a sense of trust that can extend beyond the sport into broader social and occupational realities (Kellison & Hong, 2015). In other words, sport provides a framework for building appropriate social relationships and interdependence. Individuals contribute to a sense of community through cooperation and trust, facilitating social integration and collective confidence. This process underscores sport's broader impact as a tool for uniting individuals and strengthening societal bonds.

Gender Dynamics

Sport can also foster gender equity by promoting female involvement in athletic disciplines and advancing the principle of gender mainstreaming (Newland et al., 2020). When women and girls are encouraged to participate in sporting activities, societal gaps between genders are reduced, and the efforts and achievements are appreciated. This leads to physical and mental health benefits and empowers women, providing them with opportunities to showcase their talents and strengths. Moreover, participation in sport can challenge traditional views of women's roles and abilities, opening new perspectives and influencing societal attitudes toward gender equality. Female athletes who excel in their disciplines serve as role models for younger generations, inspiring broader acceptance of equal opportunities. The representation of women in professional sport and mass media provides visibility in male-dominated areas, promoting inclusivity and normalising female participation at all levels. Although the dismantling of cultural prejudices against women's participation and leadership in sport is challenged by the persistent male-dominant sport culture, programmes and policies continue to promote sport participation of girls and women in sport (Hayhurst et al., 2021; Sotiriadou & de Haan, 2019).

Addressing Social Issues

Sporting projects are increasingly recognised for their positive influence on addressing various societal problems, including youth development and discrimination. These programmes unite individuals from diverse backgrounds, fostering skills and values that enhance socialisation and resilience. Sport-based youth development initiatives, for example, provide young people with mentorship, life skills, and constructive activities, steering them away from negative influences and promoting positive engagement (Malete et al., 2022).

Efforts to combat prejudice, racism, and bullying within and beyond sport advance social justice by encouraging participants to respect and value one another. Such initiatives not only transform individuals but also influence spectators and broader communities. Sport thus becomes more than a leisure activity —it serves as a platform for equity, social justice, and amplifying the often-overlooked voices of minorities (Spaaij & Jeanes, 2013). By breaking down social and economic barriers, sport provides a universal platform that fosters community pride and personal identity, often through support for local teams and events. This highlights the importance of integrating sport into urban planning and policy design. Policymakers and leaders who recognise sport's potential can leverage it to promote sustainable social development, improve social networks, and enhance the quality of life in communities (Malchrowicz-Mośko, et al., 2021; Middle et al., 2017).

Landscapes Produced or Altered by Sport

The transformation of natural landscapes for sporting purposes dates back to the ancient Olympic Games in Olympia. Since then, sport has continued to shape physical environments, evolving into a global industry capable of dramatically transforming landscapes. John Bale (2003) coined the term *sportscapes* to describe these areas, which geographers analyse to understand the intersection of sport and the built environment. Sportscapes are integral to urban settings and can be found in diverse forms, from school playgrounds to large stadiums. These spaces are essential features of city landscapes, reflecting how sport influences the social, cultural, and economic fabric of communities.

Stadiums and Arenas

Large-scale sport facilities, such as stadiums and arenas, are not only integral to the practice and enjoyment of sport but also serve as key elements of Sportscapes, shaping both

the physical and cultural landscapes of cities (Kellison & Hong, 2015; Thomson et al., 2018). These structures are designed to accommodate a wide range of events, from local matches to international competitions, concerts, and cultural performances, making them versatile hubs of activity. For example, the iconic Wembley Stadium in London, which hosts major football matches, concerts, and other events, is a globally recognised landmark that significantly affects the city's identity. Beyond their functional role, large-scale facilities often become cultural landmarks that influence the urban landscape, reshaping skylines and contributing to the character of their surroundings.

Recreational Spaces

These leisure facilities provide communal health-promoting interaction, social activities, and programme spaces. These convenient areas are natural or planned environments where people of all ages can exercise — individually or in groups—for an active and healthy mind and body, reducing stress and ill health (van den Bosch & Ode Sang, 2017). Such recreational spaces can help improve social cohesion since they are designed for convergence zones, promoting socialisation, creating friendships, and instilling a sense of community belongingness. Urban planners and community developers are encouraged to integrate sportscapes in neighbourhoods as they are vital to the well-being and quality of urban life, given that such spaces meet recreational needs and foster positive socio-spatial dynamics (Loder, 2020).

Event Venues

Mega sporting events such as the Olympics, Football World Cup, and Cricket World Cup transform the social landscape, both qualitatively and quantitatively. These events drive the development of sport facilities, transportation and accommodation, improving the city's long-term functionality (Kellison & Hong, 2015; Thomson et al., 2018). Beyond physical infrastructure upgrades, these events generate global awareness, facilitate cultural interflow, instil pride and sustain enthusiasm for the sport. They often have lasting effects, including the ability to attract post-event tourism and increase overall sport participation (Grix & Houlihan, 2014).

Training Facilities

Sportscapes play a critical role in developing athletic talent by providing dedicated spaces for training facilities and establishing sport academies that support talent identification and development from the grassroots level. These facilities create structured environments where young athletes can receive professional coaching, access resources, and cultivate skills early on. By focusing on grassroots development, sportscapes help discover and nurture promising talents who may otherwise lack adequate training. Establishing sport academies within these spaces fosters skill development. It promotes discipline, teamwork, and a strong sport culture among youth, creating a pipeline of talent that can progress to higher levels of competition (Hylton, 2013). The presence of well-equipped sportscapes in communities supports local sport programmes. It offers pathways for youth to excel in sport, ultimately contributing to national sport development and the broader cultural and economic benefits of a vibrant sport sector (Siedentop et al., 2020).

Natural Landscapes

Infrastructure development for purposes such as skiing, golfing, and trekking may also have physical consequences on a given area's physical environment by changing that area's physical features and species (Kellison, 2015; Kellison & Hong, 2015). Development usually includes activities like vegetation removal, landscape changes, and building road lodges, which harm plant and animal species in their natural habitat. While outdoor recreational sport and ecotourism foster

economic returns and consciousness of environmental conservation, they must be controlled to minimise adverse impacts on ecology. While planning for these sportscapes, protective strategies must include area containment, using environmentally friendly construction materials, and preventing disruption of animal activities (Banks-Leite et al., 2012). Biodiversity conservation for recreation facilitates' sustainable development means that recreational landscapes in the given regions can support people's leisure and preserve the ecological communities, ensuring both human and environmental health benefits.

Technological Innovations

The technological systems have a notable influence on the generation of sport settings that relate to the manner and class of infrastructural development of advanced sport structures and the enhancement of materials and software for practice, evaluation and communication technology for consumers. Smart technologies have been incorporated into smart stadiums to integrate sustainable energy, efficient waste management and crowd management practices, thus making events safer and more environmentally friendly (Lusweti & Odawa, 2023). Significant advancements in wearables allow athletes to see their physiological information in real time, hence improving training and recovery regimes (Kovoor et al., 2024). Finally, virtual and augmented reality elements provide engaging and appealing solutions for fans since such events can be watched remotely as if the fans were at the venue. In total, the era of technology is positively changing the future of the sport industry by making it more effective, entertaining and environmentally friendly for athletes and the audience.

Sportscapes are dynamic and multifaceted environments that reflect the intricate relationship between sport, society, and the built environment (Hallmann & Zhener, 2023). By studying and understanding sportscapes, geographers can contribute important insights into how sport influences and reshape environments and how these transformations impact individuals, communities, and the broader urban and natural landscapes. Sportscapes encompass not only the physical infrastructure, such as stadiums and parks, but also the socio-cultural dynamics that emerge around these spaces, including local identities and community cohesion (Bale, 2003). These environments often drive economic growth by attracting tourism, enhancing property values, and encouraging healthier lifestyles through accessible recreational spaces. Moreover, sportscapes contribute to environmental awareness as many facilities adopt sustainable practices, promoting a balance between development and ecological preservation (Gaffney, 2013b). Understanding sportscapes allows geographers and urban planners to create more inclusive and sustainable spaces catering to athletic and community needs (O'Reilly, 2015).

Urban Planning and Sport

Sport arenas are a crucial element of city scenery and traditions. As grand architectural structures, stadiums symbolize both location and feelings of personal and communal belonging (Guschwan, 2017). They offer a platform for sporting events and ceremonial battles among subcultural factions. Stadiums significantly impact urban political economy, media production, identity performance, socialisation processes, and the spread of political ideologies as they are designed to accommodate large crowds (Gaffney, 2006). The spatial transformation of a city is happening due to the buildup of transportation networks to connect people from different places and reshape the city's environment. Sporting architecture is one of the cityscape's priciest and most distinctive

features (Graham et al., 2021; Shen et al., 2020). Investments in sport infrastructure, such as constructing stadiums or hosting major sporting events, can stimulate urban revitalisation efforts. This can lead to the redevelopment of neglected areas, improvements in infrastructure, and economic growth (Kellison, 2024).

Global Political Economy

The global spread of sport impacts the international political economy in multiple ways, such as equipment production, athletic talent migration, and organising global mega-events. Companies like Nike, Adidas, and Reebok have established factories in different regions, influencing the production market and regional market balance (Di Maria, 2019). International mega-events such as the FIFA World Cup and the Olympic Games have hastened the process of globalisation, leading to the expansion of the global political economy by generating fresh opportunities and accessing new markets (Wolfe et al., 2021). Sport sectors attract international investment in different segments of the sport economy and create job opportunities.

Effects on Migration

Sport migration is a significant global social phenomenon involving the movement of athletes, coaches, managers, administrators, spectators, and other professionals due to sport-related activities. This migration occurs when individuals temporarily or permanently relocate across regions or countries in pursuit of opportunities in sport, competition, or employment within the sport industry (Rojo et al., 2022). Driven by economic, social, cultural, and professional motivations, sport migration is a complex aspect of globalisation that influences both local and international sport landscapes. Over the past three decades, there has been a marked shift from local to global movement within sport, with an increasing number of individuals migrating each year, affecting all continents. Similar to the concept of "brain drain," sport migration has been referred to as "foot drain" or "muscle drain" (Bale & Dejonghe, 2008), which describes the movement of talented athletes from poorer sporting events to wealthier competitions (Schieder, 2024; Stewart-Withers et al., 2017).

Sport and Tourism

Sport tourism encompasses visiting athletic competitions in various nations and locales (Getz & Page, 2016). It can be further categorised as professional and amateur tourism. Sport tourism is travelling from one's primary home to participate in a sport activity for fun or competition, watching sport at different levels, and visiting sport attractions like a Hall of Fame or water park. Sport is defined in multiple ways and from diverse viewpoints. Sport and active recreation have grown to be highly lucrative industries on a global scale. Sport tourism can be seen as a distinct combination of activity, individuals, and location. Sport tourism is a phenomenon that involves a unique combination of activity, people, and location, impacting social, economic, and cultural aspects (Higham & Hinch, 2018).

Impact of Sport on the Environment

In the previous section, the effect of sport on geography focused on the *spatial and societal transformation* caused by sport—its influence on human systems, urban planning, and cultural landscapes was discussed. This section features the impact of sport on the environment, underscoring the *ecological consequences* of sport, including resource use, pollution, and sustainability challenges. Both are interconnected, as geographical transformations (e.g., building a stadium) often have environmental implications, but they focus on distinct dimensions of sport's influence.

Land Use and Infrastructure Development

The construction of sport facilities often requires significant land use, leading to habitat destruction and ecosystem disruption.

Expanding sports infrastructure, such as stadiums and golf courses, may also lead to ecosystem destruction and landscape fragmentation. The construction of infrastructure like ski slopes and golf courses increases deforestation and alters natural landscapes. It also disturbed the soil and water systems, leading to further human encroachment and potential ecological imbalance (Kellison, 2015; Kellison & Hong, 2015).

Resource Consumption and Pollution

Sport events and activities lead to resource depletion and environmental contamination via energy consumption, transportation, and waste production (Holmes & Mair, 2020). The high energy usage from operating sport facilities and transporting athletes and fans releases greenhouse gases and air pollution. Operating and maintaining sport venues necessitate resources like water, energy, and materials, which lead to resource depletion and pollution. Activities that require a lot of energy, such as artificial snow production at ski resorts or nighttime lighting for games, may significantly increase energy consumption and carbon dioxide emissions (Sobajo, 2024). The transportation of athletes, spectators, and gear to and from sport venues can result in air and noise pollution, especially when many individuals travel far distances (Koivisto, 2021).

Waste Generation

Sporting events often generate substantial waste, including plastic bottles, food packaging, single-use items, and discarded equipment, which can overwhelm local waste management systems (Bianchini & Rossi, 2021). For instance, mega events like the FIFA World Cup or the Olympics produce tons of waste daily, underscoring the urgent need for effective waste reduction strategies. A UNEP report (2018) entitled "*Playing for the Planet: How Sport Can Drive Climate Action*" highlights integrating recycling programmes and sustainable practices into sport venues to minimise the environmental footprint. Improper waste disposal can lead to soil and water contamination, affecting ecosystems and posing threats to wildlife, such as the ingestion of plastics or entanglement in waste materials. To address this, many organisations are adopting zero-waste initiatives, such as composting food waste, using biodegradable materials, and implementing waste segregation systems at events to reduce their ecological impact (Costello et al., 2017; Nwabuwe & Odirin, 2024).

Water Usage and Pollution

Golf courses are often criticised for their high water consumption, as maintaining the lush, green turf typical of these facilities requires significant irrigation. This demand can pressure local water supplies, particularly in areas with scarce water resources (Peña, 2014; Serba et al., 2022). In drought-prone areas, this heavy water consumption can result in aquifers' depletion, reduced water availability for local communities, and stress ecosystems that rely on natural water sources. Runoff from sport facilities often contains pollutants, including fertilisers, pesticides, and herbicides, which can pollute bodies of water, impacting the quality of water and its marine inhabitants (Gosh et al., 2022; Singh et al., 2020)

Biodiversity Loss and Habitat Degradation

Converting natural environments like forests, wetlands, and grasslands into sport facilities results in a significant decline in biodiversity, as these areas often serve as critical habitats for native species (Brownlie, 2019). Indigenous plants and animals that depend on these ecosystems for nourishment, shelter, and breeding grounds are displaced or unable to survive in altered surroundings. The construction of supporting infrastructure, including roads, parking lots, and buildings, further exacerbates the problem by fragmenting natural habitats into smaller, disconnected patches. This fragmentation

disrupts wildlife and migration patterns, limits access to resources, and isolates populations, reducing genetic diversity and ecological health, making the affected environments less capable of recovering from environmental stressors like climate change or invasive species (Banks-Leite et al., 2012; International Union for Conservation of Nature, 2018).

Recommendations for Mitigating the Environmental Impacts of Sport

As the global sport industry continues to grow, so does its environmental footprint, encompassing issues such as waste generation, resource consumption, habitat disruption, and greenhouse gas emissions. Addressing these challenges requires a collaborative effort among sport organisers, athletes, fans, policymakers, and communities to adopt sustainable practices and policies. This section provides actionable recommendations to minimise the ecological impacts of sporting activities and facilities, drawing on innovative strategies and interdisciplinary approaches. The sports sector can play a pivotal role in promoting environmental stewardship by implementing measures such as sustainable infrastructure development, energy-efficient technologies, transportation innovations, water conservation, waste reduction, biodiversity protection, and awareness campaigns. These efforts not only safeguard natural resources but also inspire broader societal change toward sustainability, ensuring the longevity and resilience of both the environment and the sports industry.

Sustainable Infrastructure Development

Sport facilities must be designed using environmentally friendly materials and sustainable processes. For example, venues hosting multiple events and activities should optimise space usage to minimise land consumption while maximising sport participation. Surrounding green spaces should be carefully planned to preserve the local biome and avoid habitat destruction (Graham et al., 2021; Shen et al., 2020). Incorporating permeable surfaces into facility designs can reduce surface runoff, enhance groundwater recharge, and help restore environmental equilibrium in urban areas (Santhanam & Majumdar, 2020). Further, achieving green certifications, such as Leadership in Energy and Environmental Design (LEED), must be prioritised to align with sustainability principles and reduce the ecological footprint of sport infrastructure (Dendura, 2020).

Energy Efficiency Measures

Encourage the development of sport venues powered by renewable energy sources such as solar and wind energy systems. Upgrading existing facilities with energy-efficient technologies, including LED lighting and advanced heating, ventilation, and air conditioning systems, can lead to substantial reduction in energy consumption and greenhouse gas emissions. Additionally, the environmental impact of specific practices, such as snow production for ski resorts, should be minimised by adopting environmentally sustainable methods (Alhadad et al., 2019). Conducting regular energy audits can help identify areas and times where energy-saving measures, such as optimising lighting and heating schedules, are needed (Caffrey, 2021). Partnering with renewable energy providers to supply sustainable energy for sporting events is another practical approach to lowering the environmental footprint of sports (Bernard et al., 2021).

Transportation Innovations

To reduce greenhouse gas emissions associated with sport event transportation, encourage public transport and car-sharing among participants. Cities hosting sport events should implement transport management policies that prioritise electric buses and shuttles to minimise pollution

(Chirieleison & Scrucca, 2017). Promoting cycling and walking to sport facilities further supports environmentally friendly transport systems (Banks-Leite et al., 2012). Hosting online celebrations or providing live streams for the fans can also help reduce the need for extensive travel, hence lessening environmental impacts. Additional measures, such as installing bike-sharing stations and electric car charging points around sporting venues, can further promote sustainable travel solutions.

Water Conservation Strategies

Promote the use of efficient water technologies in sport facilities, such as drip irrigation systems and wastewater treatment, for maintaining fields and golf courses (Ortuño, 2015). In drought-prone areas, replacing high-maintenance turf with water-efficient plants can further reduce water consumption (Matlock et al., 2019; Serba et al., 2022). Incorporating water recycling systems within facilities can minimise the reliance on fresh water by reusing treated water for irrigation and cleaning. Rainwater harvesting systems can also be implemented to collect and store water for similar purposes, reducing the demand for municipal water supplies (Takeuchi & Tanaka, 2020). . Establishing clear water management policies for high-demand sport facilities is vital to ensure sustainable and water use.

Waste Reduction and Recycling Programmes

Sport organisers must ensure the availability of adequate waste disposal services, proper designated recycling stations, and widespread composting systems (Lanzendorf et al., 2023). Collaborating with organisations that provide environmentally friendly packaging for events can help reduce the environmental footprint. Educating fans to bring reusable items and encouraging proper waste disposal can further minimise landfill contributions (UNEP, 2018). Training volunteers and staff on waste segregation techniques is essential to enhance recycling efficiency and reduce overall environmental impact. Additionally, conducting comprehensive waste audits post-event enables organisers to assess the waste generated, measure its environmental impact, and refine waste management strategies for future events (Nwabuwe & Odirin, 2024).

Biodiversity Protection Plans

Before undertaking new projects involving sport facilities that could impact the environment, particularly biodiversity, thorough environmental assessments should be conducted to ensure adequate protective measures are in place (Kolawole & Iyiola, 2023). Developers should prioritise constructing facilities within already populated or distributed areas to reduce habitat fragmentation and allow the safe movement of wildlife (Kellison, 2015; Kellison & Hong, 2015). Post-construction, ecosystem damages can be mitigated and offset through habitat restoration efforts, such as rebuilding ecosystems to improve their ecological viability (Banks-Leite et al., 2012). Additional measures include growing plants indigenous to the region around sport facilities and constructing artificial meadows to promote biodiversity recovery. Involving local communities and stakeholders in conservation initiatives during the planning and construction phases can further support biodiversity protection and foster a sense of collective ownership and responsibility (International Union for Conservation of Nature, 2018).

Education and Awareness Campaigns

Sport organisers, athletes, fans, and other stakeholders must be educated about the environmental impacts of sporting activities and the steps needed to mitigate them (Greenwell, 2024). Public awareness campaigns can encourage responsible consumption, recycling habits, and eco-friendly transportation within event areas. Leveraging social media platforms and involving athletes as ambassadors for

sustainability can effectively broaden participation in environmental activities. Additionally, integrating environmental conservation principles into youth community sport programmes can foster ecological consciousness and sustainable practice from an early age (Cayola et al., 2024).

Conclusion

The intricate connection between sport and geography uncovers a dynamic interplay that shapes both physical landscapes and human interactions. Exploring this connection reveals how geography determines the accessibility, diversity, and cultural significance of sport in different regions, while sport, in turn, influences land use patterns, promotes community development, and influences perceptions of place identity. This mutual impact highlights the urgency of incorporating geographical factors into sport planning, management, and research. By acknowledging and harnessing the synergies between sport and geography, we can drive sustainable growth, strengthen social cohesion, and advocate for global access to sport. Strengthening cross-disciplinary collaboration among geographers, sport scholars, policymakers, and practitioners is vital for unlocking the full potential of this complex relationship, paving the way for innovative solutions that benefit both society and the environment.

While this narrative review offers valuable insights into the intricate relationship between sport and geography, it is essential to acknowledge its limitations. The review primarily draws on existing literature, which may not encompass all recent studies or emerging perspectives. Additionally, due to the broad scope of the topic, certain specific aspects, such as the detailed environmental impacts of sport in different cultural contexts, may not have been fully explored. The complex and multifaceted nature of the intersection between sport and geography also means that certain regional variations or nuanced case studies may have been underrepresented. Moreover, this review does not offer primary data or empirical analysis, limiting the provision of firsthand evidence or original insights that could strengthen the validity and applicability of its conclusions.

Despite these limitations, the review contributes to the literature by synthesising interdisciplinary perspectives on how geography influences sport and how sport shapes geographical spaces. It highlights the critical role of geographical factors in shaping sports participation, infrastructure, and community dynamics. Furthermore, it provides a foundation for future research by suggesting key areas where the interplay between sport and geography warrants further investigation. Through this comprehensive overview, the review adds depth to our understanding of this complex relationship, promoting the integration of geographical considerations into sport policy, planning, and practice.

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I am an independent researcher specialising in the interdisciplinary study of sport and geography. My research interests explore the mutual influences between sport environments and geographical dynamics, particularly how sport spaces impact community development, cultural identity, and urban planning. With a Geography background, my work explores the socio-economic and environmental impacts of sport on communities and landscapes.

References

Abbiasov, T., & Sedov, D. (2022). Do local businesses benefit from sports facilities? The case of major league sports stadiums and arenas. *Regional Science and Urban Economics*, 98. https://doi.org/10.1016/j.regsciurbeco.2022.103853

Alam, F., Chowdhury, H., & Moria, H. (2019). A review on aerodynamics and hydrodynamics in sports. *Energy Procedia, 160*, 798-805. https://doi.org/10.1016/j.egypro.2019.02.158

Al-Dulaimi, N. T. H., & Mahmoud Al-Qaisi, P. D. M. A. W. (2024). Britain's attitude toward 1980 Moscow Summer Olympics. *South Eastern European Journal of Public Health*, 82–90. https://doi.org/10.70135/seejph.vi.961

Alhadad, S. B., Tan, P. M. S., & Lee, J. K. W. (2019). Efficacy of heat mitigation strategies on core temperature and endurance exercise: A meta-analysis. *Frontiers in Physiology*, *10*, 71. https://doi.org/10.3389/fphys.2019.00071

Allen-Collinson, J., Jennings, G., Vaittinen, A., & Owton, H. (2019). Weather-wise? Sporting embodiment, weather work and weather learning in running and triathlon. *International Review for the Sociology of Sport*, *54*(7), 777-792. https://doi.org/10.1177/1012690218761985

Anderson, J. (2021). *Understanding cultural geography: Places and traces*. Routledge. https://doi.org/10.4324/9780367814816

Anderson-Butcher, D. (2019). Youth sport as a vehicle for social development. *Kinesiology Review*, *8*(3), 180-187. https://doi.org/10.1123/kr.2019-0029

Anuranj, C.K., & Sircar, A. (2024). Indian cricket, popular culture and "national Thing": Reflections from sport-induced nationalism. *International Journal of Applied Psychoanalytic Studies*. https://doi.org/10.1002/aps.1860

Asefi, A. and Ghanbarpour Nosrati, A. (2020). The spatial justice in the distribution of built outdoor sports facilities, *Journal of Facilities Management*, *18*(2), 159-178. https://doi.org/10.1108/JFM-09-2019-0051

Bale, J. (2003). *Sports Geography* (2nd ed.). Routledge.

Bale, J., & Dejonghe, T. (2008). Editorial: Sports geography—An overview. *Belgeo*, *2*, 157–166. https://doi.org/10.4000/belgeo.10253

Brocherie, F., Girard, O., & Millet, G. P. (2015). Emerging environmental and weather challenges in outdoor sports. *Climate*, *3*(3), 492–509. https://doi.org/10.3390/cli3030492

Banks-Leite, C., Ewers, R. M., & Metzger, J. P. (2012). Unraveling the drivers of community dissimilarity and species extinction in fragmented landscapes. *Ecology*, *93*(12), 2560–2569. https://doi.org/10.1890/11-2054.1

Bergsgard, N. A. (2018). Power and domination in sport policy and politics – three intertwined levels of exercising power. *International Journal of Sport Policy and Politics*, *10*(4), 653–667. https://doi.org/10.1080/19406940.2018.1490335

Bianchini, A., & Rossi, J. (2021). Design, implementation and assessment of a more sustainable model to manage plastic waste at sport events. *Journal of Cleaner Production*, *281*, 125345. https://doi.org/10.1016/j.jclepro.2020.125345

Bernard, P., Chevance, G., Kingsbury, C., Baillot, A., Romain, A. J., Molinier, V., ... & Dancause, K. N. (2021) Climate change, physical activity and sport: A systematic review. *Sports Medicine*, *51*, 1041–1059. https://doi.org/10.1007/s40279-021-01439-4

Black, D., Hibbeln, M. (2019). Sport and contemporary international political economy. In T. M. Shaw, L. C. Mahrenbach, R. Modi, & X. Yi-Chong (eds.) *The Palgrave handbook of contemporary international political economy.* Palgrave Handbooks in IPE. Palgrave Macmillan. https://doi.org/10.1057/978-1-137-45443-0_40

Bowness, J.S. (2020). Masters Highland Games and imaginations of home. *International Journal of Culture, Tourism and Hospitality Research*, *14*, 441-452. https://doi.org/10.1108/IJCTHR-10-2019-0179

Brown, M., & Lanci, G. (2016). Football and urban expansion in São Paulo, Brazil, 1880-1920. *Sport in History*, *36*(2), 162–189. https://doi.org/10.1080/17460263.2015.1129646

Brownlie, S. (2019). *Mitigating biodiversity impacts of new sports venues*. International Union for Conservation of Nature, Gland, Switzerland. https://doi.org/10.2305/IUCN.CH.2019.02.en

Burley, T. (1966). A note of the geography of sport, *The Professional Geographer*, *14*, 1, pp. 55-56. https://doi.org/10.1111/j.0033-0124.1962.00055.x

Burnett, C. (2018). Traditional sports and games in Eastern, Central and Southern Africa. In J. Nauright & M. Amara (eds.), *Sport in the African World* (pp. 121-145). Routledge. https://doi.org/10.4324/9781351212755

Caffrey, S. (2021). *Identify opportunities to optimise energy consumption and propose strategies for energy management on an International Sports Campus in Ireland* (Doctoral dissertation, Dublin Business School). https://esource.dbs.ie/server/api/core/bitstreams/7894387a-842b-4f4e-8b46-a639e0acb797/content

Casa, D. J., DeMartini, J. K., Bergeron, M. F., Csillan, D., Eichner, E. R., Lopez, R. M., Ferrara, M. S., Miller, K. C., O'Connor, F., Sawka, M. N., & Yeargin, S. W. (2015). National Athletic Trainers' Association position statement: Exertional heat illnesses. *Journal of Athletic Training*, *50*(9), 986–1000. https://doi.org/10.4085/1062-6050-50.9.07

Cayolla, R., Kellison, T., McCullough, B., Biscaia, R., Escadas, M., & Santos , T. (2024). Exploring the evolution of suggested improvements to pro-environmental sustainability initiatives: Empirical evidence from a professional sport team. *Journal of Strategic Marketing*. https://doi.org/10.1080/0965254X.2024.2434752

Cerezo-Esteve, S., Inglés, E., Segui-Urbaneja, J., & Solanellas, F. (2022). The environmental impact of major sport events (Giga, MEGA and major): A systematic review from 2000 to 2021. *Sustainability, 14*(20), 13581. https://doi.org/10.3390/su142013581

Chapman, R. F., Laymon, A. S., & Levine, B. D. (2013). Timing of arrival and pre-acclimatization strategies for the endurance athlete competing at moderate to high altitudes. *High Altitude Medicine & Biology*, *14*(4), 319–324. https://doi.org/10.1089/ham.2013.1022

Chirieleison, C., & Scrucca, L. (2017). Event sustainability and transportation policy: A model-based cluster analysis for a cross-comparison of hallmark events. *Tourism Management Perspectives*, *24*, 72-85. https://doi.org/10.1016/j.tmp.2017.07.020

Ciomag, R., & Pop, C.L. (2024). Cultural and sporting characteristics of countries participating in sports competitions. *MARATHON*, *26*(1). https://doi.org/10.24818/mrt.24.16.01.02

Coakley, J. (2015). *Sports in society: Issues and controversies* (11th ed.). McGraw-Hill Education.

Collins, A.J., & Roberts, A. (2017). Assessing the environmental impact of economic activity surrounding major sport events. In B. P. McCullough & T. B. Kellison (eds.) *Routledge handbook of sport and the environment* (1st ed). https://doi.org/10.4324/9781315619514

Costello, C., McGarvey, R. G., & Birisci, E. (2017). Achieving sustainability beyond zero waste: A case study from a college football stadium. *Sustainability*, *9*(7), 1236. https://doi.org/10.3390/su9071236

Cresswell, T. (2014). *Place: A short introduction* (2nd ed.). Blackwell.

Dai, J., & Menhas, R. (2020). Sustainable development goals, sports and physical activity: The localization of health-related sustainable development goals through sports in China: A narrative review. *Risk Management and Healthcare Policy*, *13*, 1419–1430. https://doi.org/10.2147/RMHP.S257844

Darnell, S. C., & Millington, R. (2018). Social justice, sport, and sociology: A position statement. *Quest, 71*(2), 175–187. https://doi.org/10.1080/00336297.2018.1545681

Davies, L. E. (2016). A wider role for sport: Community sports hubs and urban regeneration. *Sport in Society*, *19*(10), 1537–1555. https://doi.org/10.1080/17430437.2016.1159192

Day, J., Chin, N., Sydnor, S., Widhalm, M., Shah, K. U., & Dorworth, L. (2021). Implications of climate change for tourism and outdoor recreation: An Indiana, USA, case study. *Climatic Change, 169*(3-4), 29. https://doi.org/10.1007/s10584-021-03284-w

Della Villa, F., Buckthorpe, M., Grassi, A., Nabiuzzi, A., Tosarelli, F., Zaffagnini, S., & Della Villa, S. (2020). Systematic video analysis of ACL injuries in professional male football (soccer): Injury mechanisms, situational patterns and biomechanics study on 134 consecutive cases. *British Journal of Sports Medicine*, *54*(23), 1423–1432. https://doi.org/10.1136/bjsports-2019-101247

De Oca, J. M. (2018). Critical geographies of sport: Space, power and sport in global perspective. *The Geographical Review*, *108*(3), 484-486. https://doi.org/10.4324/9781315682815

Dendura, B. (2020). Olympic Infrastructure—Global problems of local communities on the example of Rio 2016, PyeongChang 2018, and Krakow 2023. *Sustainability*, *12*(1), 141. https://doi.org/10.3390/su12010141

Dichter, H.L., & Johns, A.L. (2014). Diplomatic Games: Sport, Statecraft, and International Relations since 1945. University Press of Kentucky.

Di Maria, E. (2019). A short history of the sporting goods industry. In M. Desbordes, P. Aymar, & C. Hautbois (eds.) *The global sport economy* (pp. 160-190). Routledge. https://doi.org/10.4324/9780429055034

Dong G. (2018). Understanding past human-environment interaction from an interdisciplinary perspective. *Science Bulletin, 63*(16), 1023–1024. https://doi.org/10.1016/j.scib.2018.07.013

Dykiert, D., Hall, D., van Gemeren, N., Benson, R., Der, G., Starr, J. M., & Deary, I. J. (2010). The effects of high altitude on choice reaction time mean and intra-individual variability: Results of the Edinburgh Altitude Research Expedition of 2008. *Neuropsychology, 24*(3), 3. https://doi.org/10.1037/a0018502

Fantozzi, F., & Lamberti, G. (2019). Determination of thermal comfort in indoor sport facilities located in moderate environments: An overview. *Atmosphere, 10*(12), 769. https://doi.org/10.3390/atmos10120769

Gaffney, C. (2006). *Dynamic sites and cultural symbols: The stadiums of Rio de Janeiro and Buenos Aires* [Doctoral dissertation, University of Texas at Austin].

Gaffney, C. (2013a). Geography of sport. In J. Maguire (Ed.), *Social sciences in sport* (pp. 109–131). Routledge.

Gaffney, C. (2013b). Temporality and the planning of sporting events in urban environments. In *Sport, space, and politics* (pp. 45–68). Routledge.

Gary, J.M., & Rubin, N.S. (2016). Sport promoting human development and well-being: Psychological components of sustainability. *UN Chronicle, 53*(2), 30 – 32. https://doi.org/10.18356/f16c241e-en

Gatterer, H., Dünnwald, T., Turner, R., Csapo, R., Schobersberger, W., Burtscher, M., ... & Kennedy, M. D. (2021). Practicing sport in cold environments: Practical recommendations to improve sport performance and reduce negative health outcomes. *International Journal of Environmental Research and Public Health, 18*(18), 9700. https://doi.org/10.3390/ijerph18189700

Geeraert, A. (2016). Theorizing the governance of sport mega-events: A principal-agent perspective. In S. Frawley (ed.) *Managing sport mega-events*. (pp. 24-36). Routledge. https://doi.org/10.4324/9781315757643

Geffroy, V. (2017). 'Playing with space': A conceptual basis for investigating active sport tourism practices. *Journal of Sport & Tourism, 21*(2), 95-113. https://doi.org/10.1080/14775085.2016.1271349

Getz, D., & Page, S. J. (2016). Progress and prospects for event tourism research. *Tourism Management, 52*, 593-631. https://doi.org/10.1016/j.tourman.2015.03.007

Giampiccoli, A., Lee, S. 'Shawn', & Nauright, J. (2013). Destination South Africa: Comparing global sports mega-events and recurring localised sports events in South Africa for tourism and economic development. *Current Issues in Tourism, 18*(3), 229–248. https://doi.org/10.1080/13683500.2013.787050

Gibson, O. R., James, C. A., Mee, J. A., Willmott, A. G. B., Turner, G., Hayes, M., & Maxwell, N. S. (2019). Heat alleviation strategies for athletic performance: A review and practitioner guidelines. *Temperature, 7*(1), 3–36. https://doi.org/10.1080/23328940.2019.1666624

Girardin, T., Roult, R., Sirost, O., & Machemehl, C. (2020). Social media and convergence culture: A scoping review of the literature on North American Basketball. Sage Open, 10(3). https://doi.org/10.1177/2158244020949203

Ghosh, A., Manna, M. C., Jha, S., Singh, A. K., Misra, S., Srivastava, R. C., ... & Singh, A. K. (2022). Impact of soil-water contaminants on tropical agriculture, animal and societal environment. *Advances in Agronomy, 176*, 209-274. https://doi.org/10.1016/bs.agron.2022.07.006

Graham, R., Ehlenz, M.M., & Han, A.T. (2021). Professional sports venues as catalysts for revitalization? Perspectives from industry experts. *Journal of Urban Affairs, 45*, 1841 - 1859. https://doi.org/10.1080/07352166.2021.2002698

Greenwell, T. C., Danzey-Bussell, L. A., & Shonk, D. J. (2024). *Managing sport events* (3rd ed.). Human Kinetics.

Grix, J., & Houlihan, B. (2014). Sports mega-events as part of a nation's soft power strategy: The cases of Germany (2006) and the UK (2012). *British Journal of Politics and International Relations, 16*(4), 572–596. https://doi.org/10.1111/1467-856X.12017

Guschwan, M. (2017). Stadium as public sphere. In *Sport and citizenship* (pp. 40-56). Routledge. https://doi.org/10.1080/17430437.2013.806036

Hall, C. M., & Page, S. J. (2014). *The geography of tourism and recreation: Environment, place and space*. Routledge. https://doi.org/10.4324/9780203796092

Hallmann, K., Müller, S., & Feiler, S. (2012). Destination competitiveness of winter sport resorts in the Alps: How sport tourists perceive destinations? *Current Issues in Tourism, 17*(4), 327–349. https://doi.org/10.1080/13683500.2012.720247

Hallmann, K., & Zehrer, A. (2023). Interrelationships of landscapes, sportscapes and sport experiences in destinations. *Scandinavian Journal of Hospitality and Tourism, 24*(1), 67–85. https://doi.org/10.1080/15022250.2023.2202644

Hayhurst, L. M., Thorpe, H., & Chawansky, M. (2021). *Sport, gender and development: Intersections, innovations and future trajectories*. Emerald Publishing Limited. https://doi.org/10.1108/9781838678630

Higham, J. & Hinch, T. (2018). Sport tourism development (3rd Edition). *eTextbooks for Students*. 105. https://stars.library.ucf.edu/etextbooks/105

Holmes, K., & Mair, J. (2020). Event impacts and environmental sustainability. In S. J. Page & J. Connell (eds.) *The Routledge handbook of events* (2nd ed.) (pp. 457-471). Routledge. https://doi.org/10.4324/9780429280993

Hylton, K. (2013). *Sport development: Policy, process, and practice* (3rd ed.). Routledge.

International Association of Athletics Federations. (2018). *IAAF competition rules 2018-2019*. World Athletics. https://worldathletics.org/about-iaaf/documents/book-of-rules

International Union for Conservation of Nature. (2018). *Sport and biodiversity.* https://doi.org/10.2305/IUCN.CH.2018.04.en

Jackson, S., & Sturm, D. (2021). Advertising, branding and corporate nationalism. In D. Sturn & R. Kerr (eds.), *Sport in Aotearoa New Zealand*. Routledge. https://doi.org/10.4324/9781003034445

Jowett, H., & Phillips, I.D. The effect of weather conditions on scores at the United States Masters golf tournament. *International Journal of Biometeorology, 67*(5), 1897–1911 (2023). https://doi.org/10.1007/s00484-023-02549-6

Juventeny Berdún, S. (2017). Much 'more than a club': Football Club Barcelona's contribution to the rise of a national consciousness in Catalonia (2003–2014). *Soccer & Society, 20*(1), 103–122. https://doi.org/10.1080/14660970.2016.1267624

Kellison, T. (2015). Building sport's green houses: Issues in sustainable facility management. *Kinesiology Faculty Publications. 58.* https://scholarworks.gsu.edu/kin_health_facpub/58

Kellison, T. (2024). Sporting infrastructure and urban environmental planning. In H. A. Salsberg, R. K. Storm, & K. Swart (eds.) *Research Handbook on Major Sporting Events* (pp. 362-372). Edward Elgar Publishing. https://doi.org/10.4337/9781800885653.00036

Kellison, T. B., & Casper, J. M. (2017). Environmental legacy of mega sport events. In I. Brittain, J. Bocarro, T. Byers, & K. Swart (eds.) *Legacies and Mega Events* (pp. 135-156). Routledge. https://doi.org/10.4324/9781315558981

Kellison, T. & Hong, S. (2015). The adoption and diffusion of pro-environmental stadium design. *Kinesiology Faculty Publications*. 55. https://doi.org/10.1080/16184742.2014.995690

Kenny, W. L., Willmore, J. K., Costill, D. L. (Eds.). (2024). *Physiology of sport and exercise* (9th ed.). Human Kinetics.

Kim, A. C. H., Newman, J. I., & Kwon, W. (2020). Developing community structure on the sidelines: A social network analysis of youth sport league parents. *The Social Science Journal*, *57*(2), 178–194. https://doi.org/10.1016/j.soscij.2018.11.011

Kinkaid, E. (2020). Re-encountering Lefebvre: Toward a critical phenomenology of social space. *Environment and Planning D: Society and Space*, *38*(1), 167-186. https://doi.org/10.1177/0263775819854765

Koch, N. (Ed.). (2016). *Critical geographies of sport: Space, power and sport in global perspective* (1st ed.). Routledge. https://doi.org/10.4324/9781315682815

Koenigstorfer, J., Bocarro, J. N., Byers, T., Edwards, M. B., Jones, G. J., & Preuss, H. (2019). Mapping research on legacy of mega sporting events: Structural changes, consequences, and stakeholder evaluations in empirical studies. *Leisure Studies*, *38*(6), 729–745. https://doi.org/10.1080/02614367.2019.1662830

Koivisto, T. (2021). *Air contaminants in different indoor sports facilities* (Master's thesis). https://urn.fi/URN:NBN:fi:aalto-202110319860

Kolawole, A.S., Iyiola, A.O. (2023). Environmental pollution: Threats, impact on biodiversity, and protection strategies. In S. C. Izah, & M. C. Ogwu (eds.) *Sustainable utilization and conservation of Africa's biological resources and environment. sustainable development and biodiversity* (vol 32). Springer. https://doi.org/10.1007/978-981-19-6974-4_14

Kovoor, M., Durairaj, M., Karyakarte, M. S., Hussain, M. Z., Ashraf, M., & Maguluri, L. P. (2024). Sensor-enhanced wearables and automated analytics for injury prevention in sports. *Measurement: Sensors*, *32*, 101054. https://doi.org/10.1016/j.measen.2024.101054

Krüger, M. (2015). Global perspectives on sports and movement cultures: From past to present – modern sports between nationalism, internationalism, and cultural imperialism. *The International Journal of the History of Sport*, *32*(4), 518–534. https://doi.org/10.1080/09523367.2015.1017473

Lanzendorf, T., Högemann, H., & Margaryan, L. (2023). *Review of environmental impacts of outdoor events with a focus on orienteering*. MISTRA Sport & Outdoors. https://www.diva-portal.org/smash/get/diva2:1801359/FULLTEXT01.pdf

Lee, I.S., Brown, G., King, K., & Shipway, R. (2016). Social identity in serious sport event space. *Event Management, 20*, 491-499. https://doi.org/10.3727/152599516X14745497664352

Liu, Y., Lai, L., & Yuan, J. (2020). Research on Zhanjiang's leisure sports tourism development strategy in coastal recreational areas. *Journal of Coastal Research,111*(sp1), 248-252. https://doi.org/10.2112/JCR-SI111-044.1

Loder, A. (2020). *Small-Scale urban greening: Creating places of health, creativity, and ecological sustainability* (1st ed.). Routledge. https://doi.org/10.4324/9781315642857

Lusweti, S.W., & Odawa, J. (2023). Towards the advanced technology of smart, secure and mobile stadiums: A perspective of FIFA World Cup Qatar 2022. *Computer Science and Information Technology*. https://doi.org/10.13189/csit.2023.110201

Maguire, J. (2011). *Sport and migration: Borders, boundaries, and crossings*. Routledge.

Malete L, McCole D, Tshube T, Mphela T, Maro C, Adamba C, et al. (2022) Effects of a sport-based positive youth development program on youth life skills and entrepreneurial mindsets. *PLoS ONE 17*(2): e0261809. https://doi.org/10.1371/journal.pone.0261809

Malik, S., & Saha, S. (2021). *Golf and wind: The physics of playing golf in wind* (1st ed.). Springer Nature. https://doi.org/10.1007/978-981-15-9720-6

Malchrowicz-Mośko, E., Rozmiarek, M., & Poczta, J. (2021). Eco-sport in the space of modern city. *Olimpianos - Journal of Olympic Studies*, 5, 128-140. https://doi.org/10.30937/2526-6314.v5.id127

Martin, D. S., Cobb, A., Meale, P., Mitchell, K., Edsell, M., Mythen, M. G., Grocott, M. P., & Xtreme Alps Research Group (2015). Systemic oxygen extraction during exercise at high altitude. *British Journal of Anaesthesia*, *114*(4), 677–682. https://doi.org/10.1093/bja/aeu404

Matlock, M., Whipple, R.C., & Shaw, R. (2019). Just for the turf of it: Turf replacement as a water conservation tool. *Journal of Soil and Water Conservation, 74*, 449 - 455. https://doi.org/10.2489/jswc.74.5.449

Mazúr, E., & Urbánek, J. (1983). Space in geography. *GeoJournal*, *7*, 139-143. https://doi.org/10.1007/BF00185159

McClinchey, K. A. (2022). Contributions to social sustainability through the sensuous multiculturalism and everyday place-making of multi-ethnic festivals. In A. Smith & J. Mair (eds.), *Events and sustainability* (pp. 225–239). Routledge. https://doi.org/10.4324/9781003314295

McCullough, B. P. (2023). Advancing sport ecology research on sport and the natural environment. *Sport Management Review*, *26*(5), 813–833. https://doi.org/10.1080/14413523.2023.2260078

Meir, D., & Fletcher, T. (2019). The transformative potential of using participatory community sport initiatives to promote social cohesion in divided community contexts. *International Review for the Sociology of Sport*, *54*(2), 218-238. https://doi.org/10.1177/1012690217715297

Middle, I., Hedgcock, D., Jones, R., & Tye, M. (2017). Understanding and planning for organized community sport in public parks: A case study of policy and practice in Perth. *Urban Policy and Research*, *35*(4), 443–458. https://doi.org/10.1080/08111146.2016.1272447

Moinat, M., Fabius, O., & Emanuel, K. S. (2018). Data-driven quantification of the effect of wind on athletics performance. *European journal of sport science*, *18*(9), 1185–1190. https://doi.org/10.1080/17461391.2018.1480062

Moran, E. F., & Brondízio, E. S. (2012). Introduction to human-environment interactions research. *Human-Environment Interactions: Current and Future Directions*, *1*, 1–24. https://doi.org/10.1007/978-94-007-4780-7_1

Moyle, B. D., Hinch, T., & Higham, J. (Eds.). (2018). *Sport tourism and sustainable destinations*. London, UK: Routledge. https://doi.org/10.4324/9781351213707

Mental Health Foundation. (2023). *Climate change and mental health: Our policy perspective*. https://www.mentalhealth.org.uk/our-work/policy-and-advocacy/climate-change-and-mental-health-our-policy-perspective

Nauright, J., & Zipp, S. (2018). The complex world of global sport. *Sport in Society*, *21*(8), 1113–1119. https://doi.org/10.1080/17430437.2018.1469846

Neal, S., Pang, B., Parry, K., & Rishbeth, C. (2023). Informal sport and leisure, urban space and social inequalities: Editors' introduction. *Leisure Studies*, *43*(6), 875–886. https://doi.org/10.1080/02614367.2022.2162109

Newland, B.L., Encel, K., & Phillips, P. (2020). Participation opportunities and pathways for women and girls. In E. Sherry & K. Rowe (eds.), *Developing sport for women and girls.* Routledge (1st ed.) https://doi.org/10.4324/9780367854201

Nwabuwe, N. S., & Odirin, O. (2024). Reducing environmental footprint of disability sports events: Challenges and strategies of solid waste management. *African Journal of Sports and Physical Sciences*, *2*(1), 68-95. https://doi.org/10.62154/ajsps.2024.02.010404

O'Reilly, N., Berger, I. E., Hernandez, T., Parent, M. M., & Seguin, B. (2015). Urban sportscapes: An environmental deterministic perspective on the management of youth sport participation. *Sport Management Review*, *18*(2), 291-307. https://doi.org/10.1016/j.smr.2014.07.003

Ortuño, A., Hernandez, M., & Civera, S. (2015). Golf course irrigation and self-sufficiency water in Southern Spain. *Land Use Policy*, *44*, 10-18. https://doi.org/10.1016/j.landusepol.2014.11.020

Ounanian, K., van Tatenhove, J. P. M., Hansen, C. J., Delaney, A. E., Bohnstedt, H., Azzopardi, E., Flannery, W., Toonen, H., Kenter, J. O., Ferguson, L., Kraan, M., Macias, J. V., Lamers, M., Pita, C., Ferreira da Silva, A. M., Albuquerque, H., Alves, F. L., Mylona, D., & Frangoudes, K. (2021). Conceptualizing coastal and maritime cultural heritage through communities of meaning and participation. *Ocean and Coastal Management*, *212*, Article 105806. https://doi.org/10.1016/j.ocecoaman.2021.105806

Oxford English Dictionary. (n.d.). *Sport*. In *Oxford English Dictionary online*. https://www.oed.com/

Peña Guzmán, C. A., & Mesa Fernández, D. J. (2014). Environmental impacts by golf courses and strategies to minimize them: State of the art. *International Journal of Arts & Sciences, 7*(3), 403–417.

Périard, J. D., Eijsvogels, T. M. H., & Daanen, H. A. M. (2021). Exercise under heat stress: thermoregulation, hydration, performance implications, and mitigation strategies. *Physiological Reviews*, *101*(4), 1873–1979. https://doi.org/10.1152/physrev.00038.2020

Perkins, H., & Thorns, D. C. (2017). *Place, identity and everyday life in a globalizing world*. Bloomsbury Publishing. https://doi.org/10.1007/978-1-137-29443-2

Pioletti, A. M. (2017). Sport as a driver for local development and sustainable tourism. *Revue Internationale Animation, Territoires Et Pratiques Socioculturelles*, (12), 30–46. https://doi.org/10.55765/atps.i12.598

Ponciano Núñez, P.D., & Portela-Pino, I. (2024). Deporte como vehículo de desarrollo e inclusión social desde la perspectiva de los gestores. *Revista de Investigación en Educación*, *22*(1), 6–24. https://doi.org/10.35869/reined.v22i1.5177

Ramchandani, R., Florica, I. T., Zhou, Z., Alemi, A., & Baranchuk, A. (2024). Review of athletic guidelines for high-altitude training and acclimatization. *High Altitude Medicine & Biology*, *25*(2), 113–121. https://doi.org/10.1089/ham.2023.0042

Ramshaw, G. (2014). Sport, heritage, and tourism. *Journal of Heritage Tourism*, *9*(3), 191–196. https://doi.org/10.1080/1743873X.2014.904320

Ramshaw, G. (2019). *Heritage and sport: An introduction*. Channel View Publications. https://doi.org/10.21832/ramsha7024

Revel, G. M., & Arnesano, M. (2014). Measuring overall thermal comfort to balance energy use in sports facilities. *Measurement, 55*, 382-393. https://doi.org/10.1016/j.measurement.2014.05.027

Richards, D. (2021). Applying Sustainable Development Goal 8. *The Routledge handbook of sport and sustainable development*. https://doi.org/10.4324/9781003023968-25

Rogers, A., Castee, N., & Kitchin, R. (2013). *A dictionary of human geography*. Oxford University Press. https://doi.org/10.1093/acref/9780199599868.001.0001

Rojo, J. R., Marques, R. F. R., & Starepravo, F. A. (2022). A systematic review of research on sport migration. *Migration and Diversity, 1*(1), 58–74. https://doi.org/10.33182/md.v1i1.2847

Salimi, M. (2024). An analytical model for spatial developing of sports places and spaces, *Journal of Facilities Management, 22*(5), pp. 869-882. https://doi.org/10.1108/JFM-03-2022-0026

Salarvandian, F., Hosseini, S. A., Moradi, A., & Karoubi, M. (2020). Assessing the spatial distribution of sports spaces within walking distance in Tehran. *International Journal of Urban Sciences, 24*(4), 557–577. https://doi.org/10.1080/12265934.2019.1710552

Santhanam, H., Majumdar, R. (2020). Permeable pavements as sustainable nature-based solutions for the management of urban lake ecosystems. In S. Dhyani, A. Gupta, & M. Karki (eds.) *Nature-based solutions for resilient ecosystems and societies. Disaster resilience and green growth.* Springer. https://doi.org/10.1007/978-981-15-4712-6_19

Schieder, D. (2024). Rugby and diasporic Fiji Islander sociality, In. Y. (ed.) *Towards a Pacific Island sociology of sport* (*Research in the Sociology of Sport, Vol. 22*), Emerald Publishing Limited (pp. 185-203). https://doi.org/10.1108/S1476-285420240000022010

Serba, D. D., Hejl, R. W., Burayu, W., Umeda, K., Bushman, B. S., & Williams, C. F. (2022). Pertinent water-saving management strategies for sustainable turfgrass in the desert U.S. Southwest. *Sustainability, 14*(19), 12722. https://doi.org/10.3390/su141912722

Silva, A.B. (2018). Sport: A site of exclusion or space for equality? *Studies on Home and Community Science, 11*, 107 - 97. https://doi.org/10.31901/24566780.2017/11.02.06

Skinner, J., Woolcock, G., & Milroy, A. (2018). SDP and social capital. In H. Collison, S. C. Darnell, R. Giulianotti, & P. D. Howe (eds.) *Routledge handbook of sport for development and peace*. https://doi.org/10.4324/9781315455174

Song, M. Y., & Zhang, Y. (2018). Research on the relationship between geographical factors, sports and culture. *Advances in Physical Education, pp. 8*, 66–70. https://doi.org/10.4236/ape.2018.81008

Sotiriadou, P., & de Haan, D. (2019). Women and leadership: Advancing gender equity policies in sport leadership through sport governance. *International Journal of Sport Policy and Politics, 11*(3), 365–383. https://doi.org/10.1080/19406940.2019.1577902

Spaaij, R., & Jeanes, R. (2013). Education for social change? A Freirean critique of sport for development and peace. *Physical Education and Sport Pedagogy, 18*(4), 442–457. https://doi.org/10.1080/17408989.2012.690378

Segreti, A., Fossati, C., Monticelli, L. M., Valente, D., Polito, D., Guerra, E., ... & Grigioni, F. (2024). Changes in cardiopulmonary capacity parameters after surgery: A pilot study exploring the link between heart function and knee surgery. *Journal of Functional Morphology and Kinesiology*, *9*(3), 172. https://doi.org/10.3390/jfmk9030172

Shen, J., Cheng, J., Huang, W., & Zeng, F. (2020). An exploration of spatial and social inequalities of urban sports facilities in Nanning City, China. *Sustainability, 12*(11), 4353. https://doi.org/10.3390/su12114353

Siedentop, D., Hastie, P., & Van der Mars, H. (2020). *Complete guide to sport education* (3rd ed.). Human Kinetics.

Singh, J., Yadav, P., Pal, A.K., Mishra, V. (2020). Water pollutants: Origin and status. In D. Pooja, P. Kumar, P. Singh, & S. Patil (eds.) *Sensors in water pollutants monitoring: role of material. advanced functional materials and sensors*. Springer, Singapore. https://doi.org/10.1007/978-981-15-0671-0_2

Sobajo, M. S. (2024). Environmental impact (light pollution and energy wastage) of artificial grow lighting to replenish grass pitches in sports stadiums. *World Journal of Advanced Research and Reviews*, *23*(1), 1194-1225. https://doi.org/10.30574/wjarr.2024.23.1.2111

Stewart-Withers, R., Sewabu, K., & Richardson, S. (2017). Rugby union driven migration as a means for sustainable livelihoods creation: A case study of iTaukei, indigenous Fijians. *Journal of Sport for Development*, *5*(9), 1-20.

Stronach, M., Maxwell, H., & Taylor, T. (2016). Sistas' and aunties : Sport, physical activity, and Indigenous Australian women. *Annals of Leisure Research*, *19*(1), 7-26. https://doi.org/10.1080/11745398.2015.1051067

Swope, C. B., Hernández, D., & Cushing, L. J. (2022). The relationship of historical redlining with present-day neighborhood environmental and health outcomes: A scoping review and conceptual model. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, *99*(6), 959–983. https://doi.org/10.1007/s11524-022-00665-z

Takeuchi, H., & Tanaka, H. (2020). Water reuse and recycling in Japan—History, current situation, and future perspectives. *Water Cycle*, *1*, 1-12. https://doi.org/10.1016/j.watcyc.2020.05.001

Taylor, M. (2024). *World of sport: transnational and connected histories*. Taylor & Francis. https://doi.org/10.4324/9781003355021

Thomson, A., Cuskelly, G., Toohey, K., Kennelly, M., Burton, P., & Fredline, L. (2018). Sport event legacy: A systematic quantitative review of literature. *Sport Management Review*, *22*(3), 295–321. https://doi.org/10.1016/j.smr.2018.06.011

Tomić, I. (2023). Sport and national identity. *South Eastern European Journal of Communication*. https://doi.org/10.47960/2712-0457.2.5.97

Tran, D. X., Pla, F., Latorre-Carmona, P., & Myint, S. W. (2017). Characterizing the relationship between land use land cover change and land surface temperature. *ISPRS Journal of Photogrammetry and Remote Sensing*, *124*, 119–132. https://doi.org/10.1016/j.isprsjprs.2016.12.010

Chersulich Tomino, A., Perić, M., & Wise, N. (2020). Assessing and considering the wider impacts of sport-tourism events: A research agenda review of sustainability and strategic planning elements. *Sustainability*, *12*(11), 4473. https://doi.org/10.3390/su12114473

United Nations Environment Programme. (2018). *Playing for the planet: How sport can drive climate action*. UNEP. https://wedocs.unep.org/handle/20.500.11822/30041

van den Bosch, M., & Ode Sang, Å. (2017). Urban natural environments as nature-based solutions for improved public health - A systematic review of reviews. *Environmental Research*, *158*, 373–384. https://doi.org/10.1016/j.envres.2017.05.040

Wagner, A. L., Keusch, F., Yan, T., & Clarke, P. J. (2019). The impact of weather on summer and winter exercise behaviors. *Journal of Sport and Health Science*, *8*(1), 39–45. https://doi.org/10.1016/j.jshs.2016.07.007

Wang, G., & Chen, W. (2020). The interactive development of outdoor sports and water resources industry from the perspective of geographical environment integration. *Journal of Coastal Research*, *104*(SI), 656-659. https://doi.org/10.2112/JCR-SI104-113.1

Wilmore, J. H., Costill, D. L., & Kenney, W. L. (2019). *Physiology of sport and exercise*. Human Kinetics.

Wise, N., & Kohe, G. Z. (2018). Sports geography: new approaches, perspectives and directions. *Sport in Society*, *23*(1), 1–10. https://doi.org/10.1080/17430437.2018.1555209

Wolfe, S. D., Gogishvili, D., Chappelet, J. L., & Müller, M. (2021). The urban and economic impacts of mega-events: Mechanisms of change in global games. *Sport in Society*, *25*(10), 2079–2087. https://doi.org/10.1080/17430437.2021.1903438

Woods, R., & Butler, B. N. (2020). *Social issues in sport*. Human Kinetics Publishers.

Yang, Y., & Duan, W. (2024). An interpretation of landscape preferences based on geographic and social media data to understand different cultural ecosystem services. *Land*, *13*(2), 125. https://doi.org/10.3390/land13020125

Yang, K., Xie, Y., & Guo, H. (2023). Optimization of spatial distribution of sports parks based on accessibility analysis. *PLOS ONE, 18*. https://doi.org/10.1371/journal.pone.0291235

Zhang, Z. (2024).Categories of sport-environment and condition of the sports. *Communications in Humanities Research,27*, 236-240. https://doi.org/10.54254/2753-7064/27/20231551