

## SPORT AND CLIMATE CHANGE: RESEARCH EVIDENCE AND EMERGING CONCERNS

*ESPORTE E MUDANÇA CLIMÁTICA: EVIDÊNCIAS DE PESQUISA E QUESTÕES EMERGENTES* 

*DEPORTE Y CAMBIO CLIMÁTICO: EVIDENCIA DE INVESTIGACIÓN Y TEMAS EMERGENTES* 

 <https://doi.org/10.22456/1982-8918.144750>

 **Guilherme Nothen\*** <g.nothen@ed.ac.uk>

 **Yara Acaf\*\*** <yara.acaf@utexas.edu>

 **Barry O'Sullivan\*\*\*** <Barry.OSullivan@setu.ie>

 **Glenn Houlihan\*\*\*\*** <glenn-houlihan@uiowa.edu>

 **Berk Uzun\*\*\*\*\*** <berkuzun@ufl.edu>

 **Walker Ross\*** <walker.ross@ed.ac.uk>

\* University of Edinburgh. Edinburgh, Scotland.

\*\* University of Texas at Austin (UT). Austin, Texas, USA.

\*\*\* South East Technological University (SETU). Carlow, Ireland.

\*\*\*\* University of Iowa (U of I). Iowa City, Iowa, USA.

\*\*\*\*\* University of Florida (UFL). Gainesville, FL, USA.

**Abstract:** The relationship between sport and climate change has been receiving growing scholarly attention in recent years. On one hand, researchers have sought to understand, with increasing nuance, the ongoing and potential effects of climate change on the sporting world. On the other hand, research has also examined how sport contributes to the process of climate change – for example, through waste production, pollution, biodiversity loss, and carbon emissions. The present article provides a critical overview of the existing scholarship in these burgeoning areas of study, highlighting major findings, recurring themes, and projections for the future of sport. The paper also considers how sport is adapting to the challenges imposed by climate transformations and indicates key emerging research concerns in the context of sport ecology. It then concludes by emphasizing the need to strengthen research on sport and climate change in the Global South.

**Keywords:** Sport. Climate Change. Ecology. Sport Ecology.

Received on: Dec. 18, 2024

Approved on: Apr. 23, 2025

Published in: Oct. 28, 2025



This is an article published in open access under the Creative Commons Attribution 4.0 (CC BY 4.0)

## 1 INTRODUCTION

The flooding that hit the city of Porto Alegre, RS, Brazil, in 2024 resulted in devastating human losses and massive infrastructural damage. The effects of this tragedy were also deeply felt in the context of professional sport – although these became secondary concerns given the extent of the destruction verified. The two main football stadiums in the city were largely overtaken by the water, causing significant structural problems and forcing owners to keep them closed for several months. Pictures of both pitches under water made international headlines, providing impactful visual representations of the magnitude of the disaster. Cleaning efforts to remove the mud had to rely on dozens of workers, who often reported on the foul smell inside and outside of the stadiums (Canofre, 2024). Health specialists commented on the increased risks that such cleaning efforts posed to the workers due to the potential exposure to transmittable diseases. Logistical challenges endured for several months, compounded by the closure of the city airport (also due to flooding-related damages), pushing football clubs to play their home games in other regions of Brazil. Elite training facilities were affected as well, causing disruption not only to the professional teams but also to academy players. Structural damages impacting sporting institutions beyond top professional football clubs were also pronounced – including when it comes to semi-professional, amateur, and recreational entities, which tend to experience more difficulties when trying to secure resources for reconstruction efforts.

In light of the severity of the impacts attested, what happened in Porto Alegre can be interpreted as a tragic reminder of the importance of paying greater attention to the relationship between sport and climate change. This is, in many senses, still an incipient realm of inquiry (particularly in the Brazilian context); but which has started to amass a burgeoning body of critical scholarship in recent years. This paper aims to capture the key directions in which this scholarship has unfolded, highlighting major contributions in each of the research areas selected, as further unpacked below.

In line with the example discussed in the opening paragraph, the paper begins by considering studies focused on how sports have been affected by extreme climate events. Increased preparedness to respond to such events seems essential for sports organisations, taking into account the growing consensus (in academia and beyond) that climate-related challenges will accentuate in the years to come (Orr *et al.*, 2022).

However, this is only part of the problem. Central to this paper is also an attempt to synthesize key findings from scholarly sources that explore how sports have been themselves implicated in the aggravation of climate change. Waste production, pollution, biodiversity loss, and carbon emissions are, for example, some of the areas in which sport is contributing to the degradation of the environment.

Following this section, the paper provides an overview of the academic literature on how sports organizations have creatively (and sometimes forcefully) adapted to the ongoing and forecasted challenges posed by climate change. Finally, the paper indicates questions that constitute, in the estimation of the authors, some of the most promising avenues of research in the field of sport ecology. It then concludes with a call for greater mobilization around social and political issues related to how

climate change is expected to disproportionately impact the Global South – and, by consequence, its sporting institutions and traditions.

## 2 HOW IS SPORT BEING IMPACTED BY CLIMATE CHANGE?

Organized sports are deeply connected to and dependent on nature, and any changes in the natural environment directly impact them. Thus, climate change impacts various sports stakeholders and entities such as organizations, teams, events, facilities, venues, and athletes. Researchers tend to agree that more needs to be understood about the impact of climate change on sports activities and the steps that can be taken to mitigate or adapt to these impacts (Çalik; Geri, 2022; Orr, 2020). Thus, it is important to understand the impacts of climate change on the sports industry at various levels, especially as athletes, stakeholders, and investors express growing concerns about the future of sports (Steiger *et al.*, 2019).

Among the top impacts of climate change on sports are rising temperatures and extreme heat, which can create dangerous conditions for athletes and damage playing surfaces (Ross; Orr, 2022; Mallen; Dingle; McRoberts, 2025). Excessive humidity, for example, reduces athletes' performance by slowing their pace and increasing the likelihood of errors and injuries (Ross; Orr, 2022). More importantly, athletes are more prone than others to develop heat-related illnesses – such as heat strokes, cramps, and exhaustion, as they inhale more air as they exercise, and thus more pollutants (Ross; Orr, 2022). One recent example of health concerns related to a sports event is the poor water quality during the 2024 Paris Olympic and Paralympic Games that swimmers had to endure (Mougin *et al.*, 2024). On the organizational level, sports facilities face damage to their infrastructure, making them more difficult and expensive to maintain. For example, during the 1996–2010 Millennium Drought, Australian football fields experienced compaction, which resulted in interrupted competitions, insurance risks, and higher operating and capital costs (Dingle; Mallen, 2020; Mallen; Dingle; McRoberts, 2025).

Many ski resorts worldwide are particularly vulnerable to climate change impacts, particularly those reliant on natural snowfall, as warmer winters and reduced snowfall have led to shorter ski seasons, jeopardising local economies and major events like the Winter Olympics. Studies project a decline in the number of operating ski areas, increased reliance on snowmaking, and altered competition within the industry (Steiger *et al.*, 2019). By the 2030s, half of ski areas without snowmaking capabilities could experience a considerable season shortening. Even with snowmaking as an adaptation strategy to climate change impacts, substantial reductions are projected by the 2050s under high-emission scenarios (Scott *et al.*, 2020). There is particular concern for the Olympic and Paralympic Winter Games as the number of climate-reliable locations for the games is projected to keep decreasing in the next decades even under a moderate emission scenario (Steiger; Scott, 2024). Similarly, Scott and Jones (2007) found that the golf season in Canada may be prolonged on the East Coast, but the overall trend suggests a potential for increased pressure on golf courses due to more frequent extreme weather events (such as droughts and floods)

and increased water usage because of rising temperatures, which can damage infrastructure and impact playing conditions.

Many other sports have experienced disruptions to their schedules due to climate-related event delays and cancellations caused by extreme heat and weather events. For example, the 2018 Ride to Conquer Cancer events in Alberta and British Columbia were cancelled and rerouted due to forest fires (Orr, 2023). Additionally, there is growing concern about air pollution and its impact on the health of both athletes and spectators. Ross and Orr (2022) raised these concerns during the Qatar 2022 FIFA events that took place at a time when the air quality was at unhealthy levels. The sports industry has been increasingly looking for ways to mitigate these negative climate-induced impacts on both recreational and competitive sports. The sport ecology literature agrees that the industry must adapt to the changing climate to ensure its long-term sustainability.

### 3 HOW IS SPORT CONTRIBUTING TO CLIMATE CHANGE?

Sport's relationship with the environment involves bi-directional impacts (McCullough; Orr; Kellison, 2020). The inside-out organisational view refers to sport's impact on the natural environment (Porter; Reinhardt, 2007), and it is this side of the sport ecology coin that is concerned with sports contribution to climate change. Earth's natural resources are dependent upon humans behaving in a protective manner. However, human activities involving the burning of fossil fuels are primarily responsible for the generation of greenhouse gas emissions and, consequently, the acceleration of climate change (IPCC, 2022). Sports leave, to varying degrees, a significant footprint on the environment. Through globalisation, commercialisation, over-consumption, and unsustainable practices, sports have contributed to the acceleration of climate change (Thibault, 2009; McCullough; Orr; Watanabe, 2020b; United Nations, 2022). Regardless of scale or level of competition, all sports, and their many stakeholders, engage in activities that consume natural resources, generate waste, and contribute greenhouse gas emissions to the atmosphere (Pfahl, 2013; Sotiriadou; Hill, 2015; Orr; Inoue, 2019).

Establishing sport's overall environmental impact and contribution to climate change is an immensely complex and thus far unaccomplished task (Goldblatt, 2020; Wicker; Thormann, 2022; McCullough; Murfree, 2022; Wilby *et al.*, 2023). Nevertheless, there is a general consensus about key areas in which sport plays a part in the degradation of the environment. Two pieces of work from the United Nations provide a foundational starting point in terms of understanding this problem. The Sport for Climate Action Framework (UNFCCC, 2018) and the Sport for Nature Report (UNEP, 2022) identify transportation, energy, construction, and organisational supply chains as generating byproducts that result in ecosystem damage, biodiversity loss, and contribute to climate change. Crucially, biodiversity and ecosystems on land and under water are essential for providing a nature-based solution to climate change.

The sport ecology literature has approached the evaluation of sport's contribution to climate change from a number of perspectives. For example,

researchers have separately examined the main impact areas alluded above. In this regard, transportation is considered most significant and features heavily in the scholarship of the field (e.g., Dolf; Teehan, 2015; Dosumu; Colbeck; Bragg, 2017; Triantafyllidis; Ries; Kaplanidou, 2018; Wicker, 2019; Loewen; Wicker, 2021; Herold *et al.*, 2024). The existing literature also explores stakeholder-impact perspectives, with a specific focus on either participants, teams, parents, or spectators (Collins *et al.*, 2007; Chard; Mallen, 2012; Bunds *et al.*, 2018; Pereira; Filimonau; Ribeiro, 2019; Wicker, 2019; Cooper, 2020; Castaignede *et al.*, 2021). Across this literature, various individual and team sports at regional, national, and international levels have been investigated. Despite this, African and South American contexts remain largely unexplored (Wilby *et al.*, 2023). There is also a requirement for additional work examining local and community sport (Breitbarth *et al.*, 2023).

A more comprehensive understanding of what constitutes a sporting event's total environmental impact can be obtained with reference to two models in particular. Firstly, the Sport Event Environmental Performance Measurement (Mallen *et al.*, 2010b) considers environmental impacts from an input and resource perspective (e.g., fossil fuels, electricity, water, paper, chemicals, and food), as well as from an output and waste perspective (e.g., waste, emissions, and pollutants). More recently, McCullough, Orr and Watanabe (2020) propose an externalities model that aggregates direct and external impacts relating to production and consumption, or Scope 3 impacts, before, during, and after sporting events. Notably, this model incorporates an inclusive range of stakeholders, including all staff, athletes, media, fans, sponsors, suppliers, and vendors.

Recent literature indicates a trend towards attempts to comprehensively evaluate total impacts across multiple events (Cooper; McCullough, 2021; McCullough *et al.*, 2023). While a welcome development, it carries its own challenges. There are difficulties accessing accurate data and different evaluation methods continue to be used (Mallen *et al.*, 2010b; Wilby *et al.*, 2023; Wicker; Thormann, 2024). In addition, further clarity is required surrounding Scope 3 emissions (indirect and outside the direct control of an organisation) and exactly what should and should not be considered as within sport's responsibility (Goldblatt, 2020; McCullough, 2023).

Looking to the future, it is imperative to recognise that the sports sector continues to aggressively pursue growth, encourage consumption, and increase the frequency of sporting events (Gammelsaeter; Loland, 2023; Sturm *et al.*, 2025; The Sport Ecology..., 2024). Accordingly, sport must determine which adverse and negative impacts are acceptable, and to what extent (Mallen; Chard, 2011; McCullough, 2023). Finally, the discussion regarding sport and climate change is incomplete without reference to sport's uncomfortable relationship with fossil fuel industries in the form of sponsorship and non-essential air travel (Sherry; Bramley; McCullough, 2022; Lockwood, 2023). Such practices are inconsistent with the Sport for Climate Action Framework, normalise environmental degradation, and play a highly visible role in extending a fossil fuel-dependent economy (UNFCCC, 2018; Tricarico; Simms, 2021; Mabon, 2023).

## 4 HOW IS SPORT ADAPTING TO CLIMATE CHANGE?

As disruptive and dangerous climate hazards threaten sports organizations on a more frequent basis, robust adaptation measures are increasingly vital for safeguarding athletes and fans. In the context of sport ecology, McCullough, Orr and Kellison (2020) define adaptation as “the process of making internal adjustments to accommodate environmental changes and variations” (p. 511). Mallen, Dingle and McRoberts (2025) offer a general outline of the different forms climate change adaptation can take: incremental (small-scale changes); no-regret (benefits irrespective of climate change); groundwork (preliminary steps towards adaptation); and transformative (major changes at local, regional, and national levels). With incremental adaptation, “climate change is not integrated into strategic thinking”, whereas transformative adaptation is more “strategic, fundamental, [and] long-term” (Mallen; Dingle; McRoberts, 2025, p. 6).

In their scoping review of academic literature that considers the impact of climate change on organized sports, Orr *et al.* (2022) identify several adaptive measures. One important example these authors examine is heat policies – “a possible tool for managing the incidence of heat-related illness among athletes and spectators” (p. 9). Heat policies are usually underpinned by a fixed temperature limit which triggers cooling measures such as water breaks and access to iced towels and fans (Chalmers; Anderson; Jay, 2020). Strong heat policies should refer to the Wet Bulb Globe Temperature (WBGT), which accounts for temperature, humidity, wind speed, and sunlight, and is a stronger measure of heat than air temperature alone (Clark, 2023). Despite providing players, officials, employees, and spectators with potentially life-saving relief, heat policies remain less institutionalized than other weather-related policies such as lightning safety (Orr *et al.*, 2022).

Other adaptive measures the authors identify include giving athletes extended time to acclimatize to a new environment before competing, factoring in the local climate when selecting host cities for competitions, and upgrading infrastructure and equipment. Indeed, infrastructure developments feature prominently in sports adaptation literature (Kellison; Orr, 2021; Dingle; Dickson; Stewart, 2023; Kellison; Orr; Watanabe, 2023). For instance, a study by Kellison and Orr (2021) explored how climate change “is used to catalyze the replacement of existing stadiums with more sustainable and resilient venues” in the U.S. (p. 127). The authors’ case studies include two modern Major League Baseball stadiums: the Texas Rangers’ Globe Life Field, which features a retractable roof and air conditioning, and the Miami Marlins’ hurricane-resistant Marlins Park. While these stadiums are successful examples of adaptation in the infrastructure of sports, such projects cynically evoke the climate crisis to buttress franchise owners’ demands for public funding – a process that transfers wealth from low-income community members to the wealthiest (Dinces, 2018). Moreover, as McCullough, Orr and Kellison (2020) point out, building new stadiums “can produce environmental externalities in the form of pollution during construction, increased traffic causing poor air quality in adjoining neighbourhoods, and degradation of existing green spaces” (p. 511). Poor communities typically “bear the brunt of these negative externalities” (McCullough; Orr; Kellison, 2020, p. 511).

There are other adaptations that do not pollute communities and demand public funds, such as Orr, Murfree and Stargel's (2025) exploration of rescheduling. The authors suggest challenging "strongly entrenched" traditional sports schedules to simultaneously adapt to climate hazards and mitigate climate change, pointing to the COVID-19 pandemic as proof of concept. Indeed, sports organizations, such as the English Premier League and the 2020 Tokyo Olympics, "demonstrated considerable adaptability and flexibility" through their decisions to pause, move, or even outright postpone major events (Orr; Murfree; Stargel, 2025, p. 2). In addition, competition format changes such as the National Hockey League's isolation bubbles in Toronto and Edmonton drastically cut the travel emissions typically associated with a season by centralizing matches in two locations – an action echoed in other North American leagues.

While these changes are related to COVID-19, increasingly frequent and severe climate hazards present traditional sporting schedules with similar challenges. Rescheduling as an adaptation strategy, then, "can preserve playing opportunities and player health and safety and can do so without requiring new equipment and facilities" (Orr; Murfree; Stargel, 2025, p. 3-4). On a smaller scale, rescheduling could be integrated with heat policies by moving play to cooler times of the day – a less onerous strategy than full postponement which still prioritizes the safety of athletes and spectators.

Critically reflecting on their scoping review, Orr *et al.* (2022) noted adaptations suggested by the academic literature were "principally in response to hot extremes and seasonal changes (e.g., warmer winters, seasonal shifts), with limited attention paid to extreme weather and disasters" (p. 11). With extreme weather events becoming more common (such as catastrophic recent flooding in south-eastern Spain and the south of Brazil), it is incumbent upon the sport ecology community to proactively bridge this gap in the literature. Moreover, the authors also found a striking absence of "location-specific impacts, and/or adaptation responses" in Central/South American settings – another research gap that must be addressed moving forward (Orr *et al.*, 2022).

## 5 FUTURE AVENUES OF RESEARCH IN SPORT ECOLOGY

The sports industry ought to recognise the importance of nature in sports settings and prioritize emission reduction to understand and mitigate the effects of climate change, emphasising the need for scholarly collaboration (UNEP, 2022). The development of sport ecology as a subdiscipline has deepened the understanding of the sport-environment relationship and opened pathways for future research, connecting the existing knowledge in this area with emerging research concerns (McCullough; Orr; Kellison, 2020). Although sport ecology has grown; gaps remain in theories, methods and industry-related implications (McCullough, 2023). Given the urgency, unpredictability and complexity of environmental challenges, future research would ideally adopt a global and interdisciplinary approach, fostering collaboration between academia and industry (Cury; Kennelly; Howes, 2023). This part of the paper highlights underexplored areas of study, leveraging the interdisciplinary nature of sport ecology to outline promising research avenues.

The future of vulnerable groups in sports under the impact of climate change is an emerging focus within sport ecology. From an environmental justice perspective, Chen and Kellison (2023) argue that this approach can strengthen sport ecology by addressing inequities related to race, gender, and socio-economic status in the sport industry. Considering colonial and racial histories and the needs of indigenous people is crucial for sustainable development practices, and future research can aim to bridge these gaps between research and practice as it relates to environmental justice in sport (Henhawk; Norman, 2019; Millington *et al.*, 2020; Reid, 2019). Cunningham, Wicker; McCullough (2020) found that the lack of accessibility to sports facilities and exposition to pollution (e.g., air and water) help to explain the poor health outcomes found in underdeveloped communities. Future studies could further explore the bidirectional relationship between sport, recreation, physical activity and the environment through these lenses. Similarly, Kellison (2022) emphasize the impacts of stadium planning on underserved communities; highlighting how such projects can exacerbate inequalities by polluting resources and limiting transportation access. The authors also argue that power imbalances often result in developments that economically benefit cities while burdening marginalized communities with environmental costs.

Climate refugees – that is, vulnerable groups of people forced to migrate because of climate change – present another significant area for future research in sport ecology. Collison-Randall *et al.* (2024) advocate for using novel and creative methodologies to share the experience of displaced people and encourage a micro-scale, critical perspective to draw lessons from past refugee migrations. Sport can provide a safe and supporting space to enhance the physical and mental well-being of these populations (Lawrence *et al.*, 2024), and sport ecology research can be vital in exploring ways to do so.

The interdisciplinary nature of sport ecology fosters collaboration with other disciplines (McCullough *et al.*, 2020a). One critical area is the planning and design of sport facilities in the context of climate change (Mallen *et al.*, 2010a; Mallen; Chard, 2012; McDonald; Stewart; Dingle, 2014). The rise in extreme weather events calls for a renewed focus on resilience. For example, when Hurricane Milton, a category 3 storm, hit Florida in 2024, Tropicana Field – the home of Tampa Bay Rays – was designated as the base of first responders (Tropicana..., 2024). However, high wind gusts severely damaged the stadium's roof and malfunctioned the whole facility, underscoring Orr and Kellison's (2023) call for rethinking the role of sport facilities in resilience planning and promoting the scholarly need for providing alternative solutions for practitioners.

Another promising avenue for research involves examining societal patterns such as crime and traffic incidents within sports events and facilities. This emerging trend utilizes big data, machine learning, and geographic information systems (GIS) to explore the effects of the built environment and events of varying scales on social behavior (Menaker; Sheptak Jr., 2020; Jakar; Gordon, 2022; Jakar; Gordon; He, 2023; Jakar; Gordon, 2024). Using geospatial analysis to understand how people, sport, and the environment interact can provide insights about climate change that are otherwise not explored via previous management, sociology, and climate research in

sport ecology. Thus, while this relationship remains understudied, sport ecology can play a critical role in uncovering these complexities (Jakar; Gordon, 2022).

In summary, sport ecology provides vast research opportunities, especially in examining the intersection of environmental impacts and vulnerable groups, resilience of sport infrastructure and societal challenges linked to sports settings. Future research also needs to consider more carefully the experiences of sporting organizations and communities in the Global South.

## 6 CONCLUSION

This paper examined the mutual entanglements between sport and climate change. On one hand, it sought to illustrate how sports can – and have been – affected by extreme climate events. On the other hand, it tried to indicate the most significant ways in which sports themselves are contributing to the crisis of biodiversity, pollution, and carbon emissions that the planet currently faces. Key initiatives to address these concerns within the sporting domain were also presented – stressing the importance of preparedness, flexibility, and resilience as sports organizations scramble to adapt to increasingly challenging climate conditions.

A growing body of scholarship indicates that the effects of climate change are likely to be more deeply felt in countries of the Global South (Millington *et al.*, 2020; Orr *et al.*, 2022). This is a very concerning forecast, which could lead to the accentuation of social and economic inequalities on a global scale. This scenario can also be interpreted as fundamentally unfair – in the sense that numerous populations that have historically contributed less to the process of climate change are the ones anticipated to be more heavily impacted by shifting climate dynamics. The struggle for climate justice is therefore inherently political and it is no different in the context of sports.

The international governing bodies of sports and the wealthiest sports leagues in the world have thus far done very little to mitigate the projected and actual impacts of climate change in sporting institutions and traditions in the Global South. The paucity in the implementation of such reparatory measures represents a central concern within the scope of a socially-engaged, politically-meaningful sport ecology. The promotion of research, public debate, and social action around these issues is particularly pressing when it comes to advancing preventive strategies, given the propensity to act after the fact that tends to characterize the approach to climate change in the sport industry.

More empirical evidence from regions of the Global South is essential to establish a clearer picture of the impacts of climate change in sports. Insofar as the burgeoning avenues of research presented earlier in this paper are concerned, there is one that stands out: the need to encourage and strengthen research on sport and climate change in the areas of the world that are more prone to be affected by shifting weather patterns – co-designing interventions and working with the communities that are more vulnerable to climate transformations.

Sports facilities have often been used to accommodate displaced people and rescue workers when tragedy strikes. As indicated earlier, local authorities considered using the Tropicana Field as a base of operations when Hurricane Milton hit Tampa Bay – although this plan was not effectively implemented. In Porto Alegre, the premises of the School of Physical Education, Physiotherapy and Dance at the Federal University of Rio Grande do Sul were used to temporarily host hundreds of individuals displaced during the 2024 flooding. Celebrity athletes from all over Brazil – and including from local soccer teams – were seen helping in rescue efforts in the aftermath of the event. Such examples raise interesting questions regarding the contribution that sporting infrastructure and sportspeople can give when responding to weather emergencies.

## REFERENCES

- BREITBARTH, Tim *et al.* Environmental matters in sport: sustainable research in the academy. **European Sport Management Quarterly**, v. 23, n. 1, p. 5–12, 2023. DOI: <https://doi.org/10.1080/16184742.2022.2159482>
- BUNDS, Kyle *et al.* Organized youth sports and commuting behavior: the environmental impact of decentralized community sport facilities. **Transportation research part D: transport and environment**, v. 65, p. 387–395, 2018. DOI: <https://doi.org/10.1016/j.trd.2018.08.017>
- ÇALIK, Fehmi; GERI, Serdar. Effects of global climate changes on sports and athletes. **Medicina Sportiva: Journal of Romanian Sports Medicine Society**, v. 18, n. 1, p. 3422–3429, 2022. Available at: <https://www.medicinasportiva.ro/SRoMS/RMS/57/3422-3429.pdf>. Accessed on: Nov. 27, 2024.
- CANOFRE, Fernanda. Porto Alegre convive com entulho nas ruas e mau cheiro. **Valor Econômico**, June 4, 2024. Available at: <https://valor.globo.com/brasil/noticia/2024/06/04/porto-alegre-convive-com-entulho-nas-ruas-e-mau-cheiro.ghml>. Accessed on: Nov. 27, 2024.
- CASTAIGNEDE, Laurent *et al.* The carbon footprint of marathon runners: training and racing. **International Journal of Environmental Research and Public Health**, v. 18, n. 5, p. e2769, 2021. DOI: <https://doi.org/10.3390/ijerph18052769>
- CHALMERS, Samuel; ANDERSON, Glenda; JAY, Ollie. Considerations for the development of extreme heat policies in sport and exercise. **BMJ Open Sport & Exercise Medicine**, v. 6, n. 1, p. e000774, 2020. DOI: <https://doi.org/10.1136/bmjsem-2020-000774>
- CHARD, Cheryl; MALLIN, Chris. Examining the linkages between automobile use and carbon impacts of community-based hockey. **Sport Management Review**, v. 15, n. 4, p. 476–484, 2012. DOI: <https://doi.org/10.1016/j.smr.2012.02.002>
- CHEN, Chen; KELLISON, Timothy. The clock is ticking: contexts, tensions and opportunities for addressing environmental justice in sport management. **Sport, Business and Management: an international journal**, v. 13, n. 3, p. 376–396, 2023. DOI: <https://doi.org/10.1108/SBM-08-2022-0071>
- CLARK, Jordan. **A game plan for heat stress**: policy recommendations for high school sports. Durham: Nicholas Institute for Energy, Environment & Sustainability, Duke University, 2023. Available at: <https://hdl.handle.net/10161/31695>. Accessed on: Nov. 27, 2024.

COLLINS, Andrea *et al.* Assessing the environmental consequences of major sporting events: the 2003/04 FA Cup final. **Urban Studies**, v. 44, n. 3, p. 457–476, 2007. DOI: <https://doi.org/10.1080/00420980601131878>

COLLISON-RANDALL, Holly *et al.* **Climate action through sport in the context of refugees and displacement**. London: Loughborough University, 2024. Available at: <https://hdl.handle.net/2134/26233535.v1>. Accessed on: Nov. 25, 2024.

COOPER, J. A. Making orange green? a critical carbon footprinting of Tennessee football gameday tourism. **Journal of Sport and Tourism**, v. 24, n. 1, p. 31–51, 2020. DOI: <https://doi.org/10.1080/14775085.2020.1726802>

COOPER, J. A.; MCCULLOUGH, Brian Patrick. Bracketing sustainability: carbon footprinting March Madness to rethink sustainable tourism approaches and measurements. **Journal of Cleaner Production**, v. 318, p. e128475, 2021. DOI: <https://doi.org/10.1016/j.jclepro.2021.128475>

CUNNINGHAM, George; WICKER, Pamela; MCCULLOUGH, Brian Patrick. Pollution, health, and the moderating role of physical activity opportunities. **International Journal of Environmental Research and Public Health**, v. 17, n. 17, p. 6272, 2020. DOI: <https://doi.org/10.3390/ijerph17176272>

CURY, Rubiana; KENNELLY, Millicent; HOWES, Michael. Environmental sustainability in sport: a systematic literature review. **European Sport Management Quarterly**, v. 23, n. 1, p. 13–37, 2023. DOI: <https://doi.org/10.1080/16184742.2022.2126511>

DINCES, Sean. **Bulls markets: Chicago's basketball business and the new inequality**. Chicago: The University of Chicago Press, 2018.

DINGLE, Greg; DICKSON, Geoff; STEWART, Bob. Major sport stadia, water resources and climate change: impacts and adaptation. **European Sport Management Quarterly**, v. 23, n. 1, p. 59–81, 2023. DOI: <https://doi.org/10.1080/16184742.2022.2092169>

DINGLE, Greg; MALLEN, Cheryl. Community sports fields and atmospheric climate impacts: Australian and Canadian perspectives. **Managing Sport and Leisure**, v. 26, n. 4, p. 301–325, 2021. DOI: <https://doi.org/10.1080/23750472.2020.1766375>

DOLF, Matt; TEEHAN, Paul. Reducing the carbon footprint of spectator and team travel at University of British Columbia's varsity sport events. **Sport Management Review**, v. 18, n. 2, p. 244–255, 2015. DOI: <https://doi.org/10.1016/j.smr.2014.06.003>

DOSUMU, Adekunle; COLBECK, Ian; BRAGG, Rachel. Greenhouse gas emissions as a result of spectators travelling to football in England. **Scientific Reports**, v. 7, p. e6986, 2017. DOI: <https://doi.org/10.1038/s41598-017-06141-y>

GAMMELSAETER, Hallgeir; LOLAND, Sigmund. Code red for elite sport. A critique of sustainability in elite sport and a tentative reform programme. **European Sport Management Quarterly**, v. 23, n. 1, p. 104–124, 2023. DOI: <https://doi.org/10.1080/16184742.2022.2096661>

GOLDBLATT, David. Playing against the clock: global sport, the climate emergency and the case for rapid change. **Rapid Transition Alliance**. June, 2020. Available at: <https://rapidtransition.org/resources/playing-against-the-clock>. Accessed on: Nov. 3, 2024.

HENHAWK, Dan; NORMAN, Richard. Indigenous peoples, sport and sustainability. In: MILLINGTON, Rob; DARNELL, Simon (ed). **Sport, development, and environmental sustainability**. London: Routledge, 2019. p. 163–177. DOI: <https://doi.org/10.4324/9781351128629-11>

HEROLD, David M. *et al.* Sport events and the environment: assessing the carbon footprint of spectators' modal choices at professional football games in Austria. **Journal of Cleaner Production**, v. 452, p. e-142259, May, 2024. DOI: <https://doi.org/10.1016/j.jclepro.2024.142259>

IPCC – INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE. Climate change 2022: impacts, adaptation, and vulnerability. Contribution of working group II to the sixth assessment report of the Intergovernmental Panel on Climate Change, 2022. Available at: <https://www.ipcc.ch/report/ar6/wg2>. Accessed on: Nov. 3, 2024.

JAKAR, Gidon; GORDON, Kiernan. Crime in the nominal city: an examination of the relationship between criminal incidents and professional sport venues in Dallas, Texas. **International Journal of Sport Management**, v. 25, n. 1, 50–72, 2024.

JAKAR, Gidon; GORDON, Kiernan. Dead spaces: sport venues and police stops in a major league, Upper Midwestern City in the United States. **Journal of Sport Management**, v. 36, n. 4, 355–368, 2022. DOI: <https://doi.org/10.1123/jsm.2021-0080>

JAKAR, Gidon; GORDON, Kiernan; HE, Qian. The temporal and spatial relationships between professional sport events and reported vehicular crashes: an analysis of Cleveland, Ohio. **Sport Management Review**, v. 26, n. 4, 628–648, 2023. DOI: <https://doi.org/10.1080/14413523.2022.2163074>

KELLISON, Timothy (ed). **Sport stadiums and environmental justice**. London: Routledge, 2022. DOI: <https://doi.org/10.4324/9781003262633>

KELLISON, Timothy; ORR, Madeleine. Climate vulnerability as a catalyst for early stadium replacement. **International Journal of Sports Marketing and Sponsorship**, v. 22, n. 1, p. 126–141, 2021. DOI: <https://doi.org/10.1108/IJSMS-04-2020-0076>

KELLISON, Timothy; ORR, Madeleine; WATANABE, Nicholas. The nonexcludable function of sports stadiums in climate-changed cities. **Sport in Society**, v. 26, n. 12, 1979–1998, 2023. DOI: <https://doi.org/10.1080/17430437.2023.2227588>

LAWRENCE, Stefan; HILL, Joanne; MOWATT, Rasul (ed). **Routledge handbook of sport, leisure, and social justice**. London: Routledge, 2024.

LOCKWOOD, D. Premier League domestic flights: BBC Sport research show 81 flights from 100 games. **BBC Sport**, March 23, 2023. Available at: <https://www.bbc.com/sport/football/65017565>. Accessed on: Nov. 3, 2024.

LOEWEN, Christian; WICKER, Pamela. Travelling to Bundesliga matches: The carbon footprint of football fans. **Journal of Sport & Tourism**, v. 25, n. 3, p. 253–272, 2021. DOI: <https://doi.org/10.1080/14775085.2021.1932562>

MABON, Leslie. Football and climate change: what do we know, and what is needed for an evidence-informed response? **Climate Policy**, v. 23, n. 3, p. 314–328, 2023. DOI: <https://doi.org/10.1080/14693062.2022.2147895>

MALLEN, Cheryl *et al.* Environmental sustainability in sport facility management: a Delphi study. **European Sport Management Quarterly**, v. 10, n. 3, p. 367–389, 2010a. DOI: <https://doi.org/10.1080/16184741003774521>

MALLEN, Cheryl; CHARD, Chris. A framework for debating the future of environmental sustainability in the sport academy. **Sport Management Review**, v. 14, n. 4, p. 424–433, 2011. DOI: <https://doi.org/10.1016/j.smr.2010.12.002>

MALLEN, Cheryl; CHARD, Chris. “What could be” in Canadian sport facility environmental sustainability. **Sport Management Review**, v. 15, n. 2, p. 230–243, 2012. DOI: <https://doi.org/10.1016/j.smr.2011.10.001>

MALLEN, Cheryl; DINGLE, Greg; MCROBERTS Scott. Climate impacts in sport: extreme heat as a climate hazard and adaptation options. **Managing Sport and Leisure**, v. 30, n. 2, p. 1–18, 2025. DOI: <https://doi.org/10.1080/23750472.2023.2166574>

MALLEN, Cheryl *et al.* The assessment of the environmental performance of an international multi-sport event. **European Sport Management Quarterly**, v. 10, n. 1, p. 97–122, 2010b. DOI: <https://doi.org/10.1080/16184740903460488>

MCCULLOUGH, Brian Patrick. Advancing sport ecology research on sport and the natural environment. **Sport Management Review**, v. 26, n. 5, p. 813–833, 2023. DOI: <https://doi.org/10.1080/14413523.2023.2260078>

MCCULLOUGH, Brian Patrick *et al.* Sport events and emissions reporting: an analysis of the council for responsible sport standard in running events. **Sustainability**, v. 15, n. 19, p. e14375, 2023. DOI: <https://doi.org/10.3390/su151914375>

MCCULLOUGH, Brian Patrick; MURFREE, Jessica R. An overview of Sustainable Development Goal 13. *In*: MCCULLOUGH, Brian Patrick; KELLISON, Timothy; MELTON, Nicole E. (org.). **The Routledge Handbook of Sport and Sustainable Development**. New York: Routledge, p. 315–327, 2022. DOI: <https://www.doi.org/10.4324/9781003023968-38>

MCCULLOUGH, Brian Patrick; ORR, Madeleine; KELLISON, Timothy. Sport ecology: conceptualizing an emerging subdiscipline within sport management. **Journal of Sport Management**, v. 34, n. 6, p. 509–520, 2020a. DOI: <https://doi.org/10.1123/jsm.2019-0294>

MCCULLOUGH, Brian Patrick; ORR, Madeleine; WATANABE, Nicholas Masafumi. Measuring externalities: the imperative next step to sustainability assessment in sport. **Journal of Sport Management**, v. 34, n. 5, p. 393–402, 2020b. DOI: <https://doi.org/10.1123/jsm.2019-0254>

MCDONALD, Katie; STEWART, Bob; DINGLE, Greg. Managing multi-purpose leisure facilities in a time of climate change. **Managing Leisure**, v. 19, n. 3, p. 212–225, 2014. DOI: <https://doi.org/10.1080/13606719.2014.885719>

MENAKER, Brian; SHEPTAK JR, R. Dale. The impact of game day on crime on a university police department: application of the civilizing process to sport-related law enforcement. **Journal of Policy Research in Tourism, Leisure and Events**, v. 12, n. 2, p. 172–184, 2020. DOI: <https://doi.org/10.1080/19407963.2018.1556675>

MILLINGTON, Rob *et al.* “Back in the day, you opened your mine and on you went”: extractives industry perspectives on sport, responsibility, and development in indigenous communities in Canada. **Journal of Sport Management**, v. 34, n. 6, p. 521–532, 2020. DOI: <https://doi.org/10.1123/jsm.2019-0345>

MOUGIN, Loïs *et al.* Environmental challenges facing athletes, stakeholders and spectators at Paris 2024 Olympic and Paralympic Games: an evidence-based review of mitigation strategies and recommendations. **British Journal of Sports Medicine**, v. 58, n. 15, p. 870–881, 2024. DOI: <https://doi.org/10.1136/bjsports-2024-108281>

ORR, Madeleine. Finding consensus on indicators for organizational climate capacity in sport. **Managing Sport and Leisure**, v. 28, n. 4, p. 360–378, 2023. DOI: <https://doi.org/10.1080/23750472.2021.1914710>

ORR, Madeleine. On the potential impacts of climate change on baseball and cross-country skiing. **Managing Sport and Leisure**, v. 25, n. 4, p. 307–320, 2020. DOI: <https://doi.org/10.1080/23750472.2020.1723436>

ORR, Madeleine; INOUE, Yuhei. Sport versus climate: introducing the climate vulnerability of sport organizations framework. **Sport Management Review**, v. 22, n. 4, p. 452–463, 2019. DOI: <https://doi.org/10.1016/j.smr.2018.09.007>

- ORR, Madeleine *et al.* Impacts of climate change on organized sport: a scoping review. **WIREs Climate Change**, v. 13, n. 3, p. e760, 2022. DOI: <https://doi.org/10.1002/wcc.760>
- ORR, Madeleine; KELLISON, Timothy. Sport facilities as sites of environmental and social resilience. **Managing Sport and Leisure**, v. 28, n. 1, p. 98–103, 2023. DOI: <https://doi.org/10.1080/23750472.2020.1855081>
- ORR, Madeleine; MURFREE, Jessica; STARGEL, Laura. (Re)scheduling as a climate mitigation and adaptation strategy. **Managing Sport and Leisure**, v. 30, n. 2, p. 150–155, 2025. DOI: <https://doi.org/10.1080/23750472.2022.2159501>
- PEREIRA, Rodrigo Pinheiro Taffano; FILIMONAU, Viachaslau; RIBEIRO, Glaydston Mattos. Score a goal for climate: assessing the carbon footprint of travel patterns of the English Premier League clubs. **Journal of Cleaner Production**, v. 227, p. 167–177, 2019. DOI: <https://doi.org/10.1016/j.jclepro.2019.04.138>
- PFAHL, Michael. The environmental awakening in sport. **The Solutions Journal**, v. 4, n. 3, p. 67–76, 2013. Available at: <https://thesolutionsjournal.com/the-environmental-awakening-in-sport/>. Accessed on: Nov. 24, 2024.
- PORTER, Michael; REINHARDT, Forest. A strategic approach to climate. **Harvard Business Review**, v. 85, n. 10, p. 22–26, 2007.
- REID, John. Space, environment, and appropriation: sport and settler colonialism in Mi'kma'ki. **Journal of Sport History**, v. 46, n. 2, p. 242–254, 2019. DOI: <https://doi.org/10.5406/jsporhistory.46.2.0242>
- ROSS, Walker; ORR, Madeleine. Predicting climate impacts to the Olympic Games and FIFA Men's World Cups from 2022 to 2032. **Sport in Society**, v. 25, n. 4, p. 867–888, 2022. DOI: <https://doi.org/10.1080/17430437.2021.1984426>
- SCOTT, Daniel; JONES, Brenda. A regional comparison of the implications of climate change for the golf industry in Canada. **The Canadian Geographer**, v. 51, n. 2, p. 219–232, 2007. DOI: <https://doi.org/10.1111/j.1541-0064.2007.00175.x>
- SCOTT, Daniel *et al.* Climate change and the future of the Norwegian alpine ski industry. **Current Issues in Tourism**, v. 23, n. 19, p. 2396–2409, 2020. DOI: <https://doi.org/10.1080/13683500.2019.1608919>
- SHERRY, Emma; BRAMLEY, Olivia; MCCULLOUGH, Brian Patrick. Out of bounds: coal, gas, and oil sponsorship in Australian sports. Carlton, VIC : Australian Conservation Foundation, 2022. Available at: <https://nla.gov.au/nla.obj-3165057127/view>. Accessed on: Nov. 3, 2024.
- SOTIRIADOU, Popi; HILL, Brad. Raising environmental responsibility and sustainability for sport events: a systematic review. **International Journal of Event Management Research**, v. 10, n. 1, p. 1–11, 2015. Available at: <https://core.ac.uk/download/pdf/161283989.pdf> Accessed on: Nov. 24, 2024.
- STEIGER, Robert; SCOTT, Daniel. Climate change and the climate reliability of hosts in the second century of the Winter Olympic Games. **Current Issues in Tourism**, p. 1–14, 2024. DOI: <https://doi.org/10.1080/13683500.2024.2403133>
- STEIGER, Robert *et al.* A critical review of climate change risk for ski tourism. **Current Issues in Tourism**, v. 22, n. 11, p. 1343–1379, 2019. DOI: <https://doi.org/10.1080/13683500.2017.1410110>
- STURM, Damion *et al.* Green light or black flag? Greenwashing environmental sustainability in Formula One and Formula E. **Annals of Leisure Research**, v. 28, n. 1, p. 116–135, 2025. DOI: <https://doi.org/10.1080/11745398.2024.2376754>

THIBAUT, Lucie. Globalization of sport: an inconvenient truth. **Journal of Sport Management**, v. 23, n. 1, p. 1-20, 2009. DOI: <https://doi.org/10.1123/jsm.23.1.1>

TRICARICO, Emilie; SIMMS, Andrew. Sweat not oil. Why sport should stop advertising and sponsorship from high-carbon producers. **Badvertising**, p. 1–52, March, 2021. Available at: <https://www.badverts.org/s/Sweat-Not-Oil-why-Sports-should-drop-advertising-from-high-carbon-polluters-March-2021v3.pdf>. Accessed on: Nov, 3, 2024.

TRIANAFYLLIDIS, Stavros; RIES, Robert; KAPLANIDOU, Kyriaki. Carbon dioxide emissions of spectators' transportation in collegiate sporting events: Comparing on-campus and off-campus stadium locations. **Sustainability**, v. 10, n. 1, p. e241, 2018. DOI: <https://doi.org/10.3390/su10010241>

TROPICANA Field roof ripped off by Hurricane Milton. **Fox News**, October 10, 2024. Available at: <https://www.fox13news.com/news/video-hurricane-miltons-high-winds-tear-portion-roof-off-tropicana-stadium-st-petersburg>. Accessed on: Nov. 30, 2024.

THE SPORT ECOLOGY GROUP; THE SUSTAINABILITY REPORT. Three years of progress: a review of sustainability across the 2021-2024 Olympic cycle. Toronto: [s.n.], 2024. Available at: [https://www.sportecology.org/\\_files/ugd/a700be\\_2fbabee993214286bc1dd73d169e5860.pdf](https://www.sportecology.org/_files/ugd/a700be_2fbabee993214286bc1dd73d169e5860.pdf). Accessed on: Nov. 3, 2024.

UNEP – UNITED NATIONS ENVIRONMENT PROGRAMME. **Sport for Nature**: setting a baseline. Nairobi, 2022. Available at: <https://www.unep.org/resources/publication/sports-nature-setting-baseline-handbook>. Accessed on: Nov. 3, 2024.

UNFCCC – UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE. **Sport for climate action framework**. 2018. Available at: [https://unfccc.int/sites/default/files/resource/Sports\\_for\\_Climate\\_Action\\_Declaration\\_and\\_Framework.pdf](https://unfccc.int/sites/default/files/resource/Sports_for_Climate_Action_Declaration_and_Framework.pdf). Accessed on: Nov. 3, 2024.

UNITED NATIONS. **Addressing Climate Change through Sports**. UN Department of Economic and Social Affairs Economic Analysis, Policy Brief No. 128, 2022. DOI: <https://doi.org/10.18356/27081990-128>

WICKER, Pamela. The carbon footprint of active sport participants. **Sport Management Review**, v. 22, n. 4, p. 513–526, 2019. DOI: <https://doi.org/10.1016/j.smr.2018.07.001>

WICKER, Pamela; THORMANN, Tim. Environmental impacts of major sport events. In: SOLBERG, Harry; STORM, Rasmus; SWART, Kamilla. **Research Handbook on Major Sporting Events**. Cheltenham: Edward Elgar Publishing, 2024. p. 373–385. DOI: <https://doi.org/10.4337/9781800885653.00037>

WICKER, Pamela; THORMANN, Tim. Measuring Sustainable Development Goal 13. In: MCCULLOUGH, Brian Patrick; KELLISON, Timothy; MELTON, Nicole (ed.). **The Routledge Handbook of Sport and Sustainable Development**. New York: Routledge, 2022. p. 328–335. DOI: <https://www.doi.org/10.4324/9781003023968-39>

WILBY, Robert *et al.* The impacts of sport emissions on climate: measurement, mitigation, and making a difference. **Annals of The New York Academy of Sciences**, v. 1519, n. 1, p. 20–33, 2023. DOI: <https://doi.org/10.1111/nyas.14925>

**Resumo:** A relação entre esporte e mudança climática tem recebido crescente destaque na esfera acadêmica. Por um lado, os pesquisadores têm buscado compreender, de forma cada vez mais detalhada, os efeitos concretos e potenciais da mudança climática no mundo esportivo. Por outro, estudos também têm focado em como o esporte contribui para o processo de mudança climática – por exemplo, por meio da produção de resíduos, poluição, perda de biodiversidade e emissões de carbono. O presente artigo propõe uma síntese crítica da literatura acadêmica nessas áreas emergentes de estudo, destacando as principais descobertas, temas recorrentes e projeções para o futuro do esporte. O artigo também considera como o esporte está se adaptando aos desafios impostos pelas transformações climáticas e indica alguns dos principais problemas de pesquisa no campo da ecologia do esporte na atualidade. Por fim, o texto enfatiza a necessidade de fortalecer a pesquisa sobre esporte e mudança climática no Sul Global.

**Palavras-chave:** Esporte. Mudança Climática. Ecologia. Ecologia do Esporte.

**Resumen:** La relación entre deporte y cambio climático ha recibido una atención cada vez mayor en el ámbito académico. Por un lado, los investigadores han tratado de comprender, cada vez más detalladamente, los efectos concretos y potenciales del cambio climático en el mundo del deporte. Por otro lado, los estudios también se han centrado en cómo el deporte contribuye al proceso de cambio climático, por ejemplo, mediante la producción de residuos, la contaminación, la pérdida de biodiversidad y las emisiones de carbono. Este artículo propone una síntesis crítica de la literatura académica en estas áreas de estudio emergentes, destacando los principales hallazgos, temas recurrentes y proyecciones para el futuro del deporte. El artículo también considera cómo el deporte se está adaptando a los desafíos que plantea el cambio climático e indica algunos de los principales problemas de investigación en el campo de la ecología del deporte en la actualidad. Finalmente, el texto enfatiza la necesidad de fortalecer la investigación sobre deporte y cambio climático en el Sur Global.

**Palabras clave:** Deporte. Cambio Climático. Ecología. Ecología Deportiva.

## USE LICENSE

This article is published as Open Access under the Creative Commons Attribution 4.0 International (CC BY 4.0) license, which allows its use, distribution and reproduction in any medium as long as the original work is properly cited. More information at: <http://creativecommons.org/licenses/by/4.0>

## CONFLICT OF INTERESTS

The authors declare that this work involves no conflict of interest.

## AUTHOR CONTRIBUTIONS

**Guilherme Nothen:** General writing plan, introduction, conclusion, insertions throughout the piece, review of the referencing style.

**Yara Acaf:** Literature review and discussion on how sports have been impacted by climate change, proofreading.

**Barry O'Sullivan:** Literature review and discussion on how sports have impacted climate change, proofreading.

**Glenn Houlihan:** Literature review and discussion on how sports have adapted to climate change, proofreading.

**Berk Uzun:** Literature review and synthesis on promising avenues of research regarding sport ecology, proofreading.

**Walker Ross:** Literature review, general insertions throughout the piece, enhancement of the articulation between sections, proofreading.

## FUNDING

This study was not supported by funding sources.

## RESEARCH DATA AVAILABILITY

Uninformed

## HOW TO CITE

NOTHEN, Guilherme; ACAF, Yara; O'SULLIVAN, Barry; HOULIHAN, Glenn; UZUN, Berk; ROSS, Walker. Esporte e mudança climática: evidências de pesquisa e questões emergentes. **Movimento**, v. 31, p. e31040, jan./dez. 2025. DOI: <https://doi.org/10.22456/1982-8918.144750>

## EDITORIAL RESPONSIBILITY

 Alex Branco Fraga\*

 Elisandro Schultz Wittizorecki\*

 Mauro Myskiw\*

 Raquel da Silveira\*

\* Universidade Federal do Rio Grande do Sul, Escola de Educação Física, Fisioterapia e Dança, Porto Alegre, RS, Brazil.