

The future of Brazilian professional football under the impact of the climate crisis by 2040

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Abstract

This study explores two central questions: What are the critical uncertainties posed by the climate crisis to the future of Brazilian professional football? And how can these uncertainties inform adaptive strategies for key stakeholders in the sector? The underlying premise is that the intensification of climate-related disruptions by 2040 will require structural adaptations in Brazilian professional football, with uneven impacts across regions, teams, and fan communities.

Adopting an exploratory and anticipatory approach grounded in Foresight and Futures Studies, this research employs methods such as desk research, 7 Questions Method, STEEP Analysis and Impact-Uncertainty Grid. By taking in consideration the opinion of specialists from the teams staff, broadcasting media professionals and super fans, this paper identifies potential systemic impacts of climate disruptions on key aspects of the sport, including athlete health, match scheduling, fan attendance, infrastructure, and financial sustainability.

Keywords: Football, Future of Sports, Climate Change, Sustainability, Brazil, Impact-Uncertainty Grid

The Country of Football

In Brazil, there are around 5,000 football clubs and almost 800 stadiums registered by federations and confederations by 2021. Furthermore, the number of athletes registered reaches 360,000—a figure close to the total population of Iceland. Of this total amount, 90,000 are part of the professional ranks (Soares, 2021).

Culturally, football is a massive deal. It represents the country's cultural identity worldwide, and its relevance transcends social background or status. During the World Cup, the Brazilian National Team's matches represent a moment of pause and hope: classes are suspended, workers are released from their shifts, and people gather in bars and restaurants to cheer for the Brazilian '*Seleção*' (Globo Gente, 2018).

A pattern can be found alongside the past century: fathers pass on the passion for their football club to their children, and family gatherings and routines revolve around the matches during the week. Similar stories were observed in this study interviewees' backgrounds. It is the icebreaker when starting a conversation with an uncle, a stranger, or a friend. It is the truce in a personal disagreement between siblings, or the bond that unites Brazilians—who may have their internal disputes but stand together as a nation if someone from the outside criticizes Brazilian football.

In 2023, the Série A of the national championship, composed of the top 20 teams in Brazil, ranked among the top 15 most lucrative sports leagues in the world, earning US\$1.8 billion that year. It was the only championship from a developing country to be ranked (Somoggi, 2024). The annual earnings of Brazil's top-tier football clubs grew 35.7% in 2019 compared to 2015, reaching US\$1.45 billion. Despite this, the clubs' debts in 2019 were higher, reaching US\$2.07 billion—a 28.5% increase compared to 2015 (Capelo, 2020). So, even though football in Brazil is a lucrative business, the current volume of debt already shows how teams are extremely vulnerable to uncertain future scenarios, for which they are not prepared at all (Lois, 2025).

The global sports market moves approximately US\$756 billion each year. Research by Sports Value shows that for every dollar directly generated by a sports league, 2.5 dollars can be produced indirectly in the economy (Somoggi, 2020). In Brazil, the economic impact generated by football represents approximately US\$9,94 billion, stimulating tourism, local commerce, real estate appreciation, transport infrastructure, and job creation, accounting for an estimated 0.72% of the Brazilian GDP (Soares, 2021).

Through this political, social, and economic history of football in the country, it is possible to understand that the systems connected to it are complex and fraught with interests that can often override the well-being of the athletes and the fans.

Climate change & outdoor sports

The year of 2024 was the hottest ever recorded globally since 1850, with the average temperature reaching 1.5°C above pre-industrial levels (Bernardes, 2025). Rising temperatures trigger higher ocean evaporation,

increasing air humidity and leading to more intense rainfall, prolonged droughts, heatwaves, and a higher propensity for wildfires.

The economic and social impacts of major natural disasters on the football industry in Brazil were seen recently, in 2024, when massive flooding overtook an entire state in the south of the country, destroying stadiums and equipment, displacing families, and interrupting the national championship for two weeks. Unprepared organizations had to rebuild structures from scratch with little to no financial support; training sessions had to be relocated to other states, and the resulting chaos led to early elimination from international competitions, further reducing earnings. The estimated damage was approximately US\$17 million, while the CBF (Brazilian Football Confederation) contributed the equivalent of only US\$1 million toward this amount (Girardon & Favero, 2025).

In addition to all that, “professional athletes are explicitly considered to be a risk group with regard to climate change-related health risks. Impacts are due to extreme temperature, heatwaves, extreme weather events, ultraviolet radiation or climate-induced changes to our ecosystem like air pollutants, allergens, viruses and bacteria as well as the associated vector and natural reservoirs.” (Schneider & Mücke, 2025).

A study estimates that 78% of football clubs in the A, B, and C series of the Brazilian Championship are in municipalities with a high risk of severe climate events over the next 25 years. The total estimated cost for infrastructure repairs, logistics, and lost revenue during this same period is US\$556 million. Many clubs face the risk of losing market value and could even cease operations if they are unable to cover these expenses (Terra, 2025).

A study shows that “14 of 16 World Cup 2026 stadiums already exceeded safe-play thresholds in 2025 for at least three major climate hazards – including extreme heat, unplayable rainfall, and flooding. Risks intensify at every venue by 2050.” (Lockwood & Hickson, 2024).

Football as an agent

Football practice is not only a victim of climate change but also a big agent. It is estimated that the global football industry produces more than 30 million tonnes of carbon dioxide annually, roughly the equivalent of the total emissions generated by Denmark (Lockwood & Hickson, 2024).

In the 2025-2026 season, the top 15 richest football teams in the world traveled an astonishing 183,095 kilometers by plane for pre-season matches. This number equals approximately four and a half complete laps around the globe (Lois, 2025).

Pollution and high energy demand due to this activity can be generated through carbon emissions, since Brazil's continental geographic proportions, different from countries from Europe or Argentina, for example. Globalization is making national and international flights more frequent. In 2024, the national team with most matches scheduled in one year played 75 times (Quadros, 2024), so air travel is almost a requirement to attend the tight calendar and the long-distance demands.

The sports industry profits a lot with all this pollution and shows no signs of scaling it down, even though some sparse regulation measures are being taken by the international federation FIFA and the Brazilian confederation CBF (Williams, 2025). A significant amount of the capital circulating in the football market also stems from sponsorships by companies that contribute massively to high carbon emission rates and profit from practices that run counter to sustainability, such as oil, mining, and airline companies.

So the main question is: Considering the social, cultural, economic and political relevance that professional football has in Brazil so far, what are the main uncertainties regarding extreme climate-change impacts in this business in 2040?

Methods: Interview and Uncertainty Mapping

For this study 10 people directly affected by the changes in climate were interviewed, including specialists and super fans – ones that have a more intense relation with football, regularly attending the venues and often traveling in group to cheer for their teams. They were categorized in 3 main groups:

Athletes & Teams: 2 physical trainers from top professional teams – one of them trained the national team in the 2022 World Cup – and 1 hydration specialist researcher.

Media & Broadcast: 1 Chief Technology Officer from a giant broadcast corporation in Brazil, 1 journalist focused on environmental impacts on sports, 1 journalist from a football Fantasy Game and 1 sports

event producer and responsible for the sports ESG initiative, all from the same broadcast corporation mentioned.

Audience & Super Fans Group: 2 Super Fans from Rio Grande do Sul state that cheer for two top teams affected by the big flood in 2024. 1 Super Fan that cheers for a top team in Rio de Janeiro.

The 7 Questions Method from Shell was the baseline for these interviews. For each of the three groups, an adapted set of questions was used, regarding the subject that fit the interviewees' part in the football system.

Questions	Athletes & Clubs	Media & Broadcast	Audience & Super Fans
1	What were the professional challenges faced while working with professional football? What were the lessons learned that changed the way you work in the last 5 years?	What were the professional challenges faced while working on the coverage of professional football events? What were the key takeaways that have changed your way of working over the last 5 years?	How much does football matter to you? How has your relationship with football evolved over the last 5 years?
2	Climate characteristics have been causing match suspensions, changes to the laws of the game, and affecting athlete performance. How do you believe this impacts your journey in professional football? Has anything changed during and after the pandemic or the floods in 2024?	What do you see as the primary factors shaping the future of professional football coverage in Brazil over the next 15 years, considering climate change and extreme weather events?	Climate patterns have been causing match suspensions, rule changes, and affecting athlete performance. How do you believe this impacts your journey and your relationship with professional football? Did anything change during and after the pandemic or the floods in Rio Grande do Sul?

3	Optimistic Future: 15 years from now, how do you expect professional football confederations and clubs in Brazil could prepare to offer ideal conditions for you, considering the issues we've discussed? What would be the signs of success?	An optimistic but realistic outcome. If everything went well, how would you expect the coverage of professional football events in Brazil to develop, and what would be the signs of success?	Optimistic Future: 15 years from now, how do you expect the organization and coverage of professional football events in Brazil to prepare in order to provide a better experience for you, considering the issues we've discussed? What would be the signs of success?
4	Pessimistic Future: And within that same timeframe, how could the scenario change and threaten your professional experience in Brazilian football? How could it deteriorate?	How could the scenario change and threaten the coverage of professional football events in Brazil? How could it deteriorate?	Pessimistic Future: And within that same timeframe, how could the scenario change and threaten the organization and coverage of professional football events in Brazil? How could it deteriorate?
5	What is the importance of football to Brazilian society, and what impact could a change in the context of professional football event coverage have?	What is the importance of football to Brazilian society, and what impact could a change in the context of climate event coverage have?	What is the importance of football to Brazilian society, and what impact could a change in the context of professional football event coverage have?
6	Looking to the future, what is the first step that needs to be taken—whether at the club, federation, or government level—to achieve the optimistic outcome in the long term?	“Looking to the future: what decisions need to be taken in the short term, whether at the corporate level or otherwise, to achieve the optimistic outcome in the long term?”	Looking toward the future, what is the first step that must be taken—whether by clubs, federations, or governments—to achieve the optimistic outcome in the long term?

7	If you had a power, free from any restriction, what would you do to ensure a successful future for working with professional football in Brazil?	If you had a power, free from any restriction, what would you do to ensure a successful future for the coverage of professional football events in Brazil?	If you had a power, free from any restriction, what would you do to ensure a successful future for the coverage of professional football events in Brazil?
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After consolidating the insights gathered from the interviews, reports’ analysis and news, a multidisciplinary workshop involving other specialists was conducted. The objective was to foster a debate among the different professionals and define the criticality and uncertainty of the findings using a matrix, thereby getting to the core conclusion of this study.

Athletes and Teams: Main findings

Professional athletes taking the pitch are perhaps the most directly affected by climate change. Studies show that they are more prone to heat strokes, dehydration, and sunburns due to high temperatures and high humidity, especially during the summer (Schneider & Mücke, 2025). The use of synthetic turf is critical because it retains heat, increasing the average pitch temperature and causing burns and blisters on players’ feet during days of intense heat, which can require weeks off the field for a full recovery.

Since Brazil is a large country, frequent long-distance trips by plane are necessary, which contributes to high carbon emissions. Interviewees stated that it helps teams to keep up with the team’s schedule but makes athletes more tired. That’s because they prefer to take night flights than to sleep over and leave in the morning.

Beyond physical health, mental health can also be severely impacted by changing climate patterns. The 2024 floods that affected major clubs hit not only the players and their families but the entire club staff. Although it was possible to train and continue playing in other cities, players stated that the impact of the tragedy prevented them from focusing on the game; some experienced depression and even considered retiring from their careers (Oliveira, 2025).

There is also a decisive economic disparity between clubs. In small

cities, the local team may be the primary direct and indirect employer. Coaches, players, support staff, security, cleaning, maintenance, and administrative services are all part of an ecosystem sustained by the club (Agencia Market, 2025). However, smaller clubs like Brusque are already facing difficulties today. Despite being among the top 40 in the country, athletes report that “they don’t provide a gym; whoever wants one has to go after it themselves. They don’t do physical work in the gym; they just bring the weights to the pitch.” (Fonseca & Console, 2022). The scenario of financial worsening generated by climate change tends to deepen these issues.

Football confederations worldwide still present timid regulations regarding measures involving climate change applied to sporting events (Alves, 2025). There is no unified guideline regarding carbon emission control by clubs, the amount of resources used for stadium construction and maintenance, or adaptations to the game rules that may consider the well-being of the main characters involved in the spectacle of football.

Media & Broadcast: Main findings

Major media companies are among the primary promoters of sports in Brazil. They hold a seat at the negotiation table for broadcasting rights alongside other key football stakeholders, such as clubs and confederations. For years, each party has defended its own interests, and these negotiations dictate not only how the Brazilian population have access to the spectacle but also which kickoff times and matchdays are the most lucrative. This makes any attempt to adapt match schedules to prioritize the well-being of players and fans a complex issue to resolve.

The evolution of digital broadcasting has democratized fan access to matches, which previously relied on limited TV windows and stadium attendance. This broadcasting process had to evolve rapidly due to the restrictions imposed by COVID-19, and that production legacy continues today. Digitalization was fundamental in extreme scenarios, such as the quarantine period or for fans affected by the 2024 floods.

Giant corporations like Globo are committed to establishing rigorous ESG (Environmental, Social, and Governance) criteria for their broadcasting teams. Guidelines include prioritizing studio-based broadcasts over on-site presence, using drones instead of helicopters for aerial footage

(Globo ESG, 2025), employing reusable covers for filming equipment, and adopting electric vehicles to transport employees across studio lots, to name just a few of the various guidelines.

An anticipatory vision is essential for these companies to make their business more resilient and less dependent on the occurrence of matches. Recurring interruptions and cancellations of sporting events can lead to financial losses, drops in audience numbers, the collapse of advertising deals and wasted investment in the acquisition of broadcasting rights.

Media companies also play a social role in investigating and reporting systemic failures within football and government negligence, pushing for the enforcement of regulations and the adoption of risk mitigation measures. Furthermore, they hold a pedagogical role in educating Brazilians about climate change, clarifying the severity of its cultural, social, and economic impact across all affected spheres.

Audience & Super Fans: Main findings

Even though the effect of collective catharsis acts as an impulse that motivates or pressures players on the pitch to give their best, the scenario constructed over recent years is one of elitism and segregation. For instance, an official ticket for the 2026 World Cup final can reach a staggering US\$8,860, five times the price of the previous edition in Qatar (Brooker, 2025).

Beyond ticket prices, fans have pointed out the difficulties of being exposed to severe weather conditions both within stadiums and during the commute to them. When matches are suspended due to climate interference, fans are left vulnerable and uncertain about how to return home safely. In the case of traveling fans, these disruptions can further impact the logistics of flights and accommodation.

Stadiums in Brazil often suffer from precarious infrastructure, frequently lacking functional water fountains, charging exorbitant prices for food and beverages inside, and maintaining conflicting rules regarding the permission of plastic water bottles. Also, they offer no means to mitigate extreme heat or cold. While some international stadiums feature climate control systems, this is far from being a reality in the national context.

It is not only inside the stadium that these fans expose themselves to vulnerable situations to support their teams. Many travel for hours,

or even days, in substandard buses to cheer in other states or countries. Some stand under the sun for an entire day to welcome athletes in person or celebrate a title. In late 2025, approximately 200,000 fans of Flamengo—champions of both the Americas and Brazil—gathered in downtown Rio de Janeiro, reporting that extreme heat caused many to fall ill (Daily Motion, 2025). The same occurred during Corinthians' celebrations in the same period, forcing the clubs to implement improvised logistics for water supply and medical assistance (Radio Itiataia, 2025).

In sporting events, it is estimated that 85% of carbon emissions are due to the travel and accommodation of fans, whether domestic or international (Sport Resolutions, 2023). Obtaining a reliable measurement of these figures and acting to reduce this impact remains a significant challenge on the path toward a more sustainable football.

The uncertainties of football by 2040

A debate with multidisciplinary specialists, prioritizing the study's findings, highlighted the uncertainties with the greatest impact on the future landscape of Brazilian football. These are presented in the thematic clusters below.

The first cluster connects the scale of climate change's impact on the game, the inequality in access to technology between bigger teams and smaller ones, and the potential reduction in the number of matches in championships.

All these uncertainties directly affect club revenues, as the costs of restructuring or mitigation may be unfeasible for many. Only teams with more resources will be able to build more adapted structures, relocate to areas with lower risks of severe weather, and invest in monitoring equipment and athlete preparation to face the challenges of intense heat.

Could this be the end of democratized football, which allows for the representation of small towns and inland regions? To what extent are sustainability measures defined by Eurocentric contexts feasible and applicable within the Brazilian context?

The second cluster covers a sphere external to the football business itself, as governmental inaction or inefficiency regarding urban infrastructure resilience, deep economic crises caused by severe weather, or global wars and conflicts could affect the sport.

The clubs from Rio Grande do Sul were able to rebuild themselves a few months after the devastating floods of 2024. However, without serious prevention and mitigation work by the government to address new catastrophes, these clubs could suffer new blows, with a different outcome this time.

Besides that, an economic crisis harms not only the clubs but also the fans, who are left with less purchasing power to become their football club members, buy tickets and official products, or pay for streaming subscriptions. These crises also reduce revenue for sports sponsors and make the cost of broadcasting events unfeasible for media companies.

The final cluster encompasses the social aspect of football, considering the changing consumption behavior of a generation characterized by immediacy and dispersed focus, the increased health risks for fans in outdoor venues, and the influence that social pressure and the market may exert on the confederations that regulate the sport.

During the debate, the interviewed specialists agreed that the chances of a decline in fan interest in football is very low, even as the country faces moments of crisis. During the Covid-19 pandemic, the connection to the sport was maintained through teams' and athletes' social media, broadcasts of historic matches, nostalgic content, and interviews. Conversely, other sports like baseball have altered their traditional rules to recover lost audiences, reducing average game times and increasing the game's dynamism (Will, 2024). Will traditional 90-minute football on an open pitch lose ground to a version adapted to society's new circumstances?

In interviews, fans of clubs impacted by the floods described the pain and fear faced since the tragedy. One said, "I would go through five more pandemics, but not another flood. Any heavy rain terrifies us now." Another stated "I had to remain armed and take responsibility for the security of an improvised shelter for flood victims", even as an ordinary citizen. "Yet, even in those circumstances, I found myself thinking about my football team's performance. I was embarrassed to feel that way". The point is that climate phenomena affect the lives of fans far beyond what happens on the pitch. How can we expect football to be a refuge of hope and happiness for a society that may face a reality of resource and food scarcity, health threatened by relentless heat, and the loss of all their possessions and loved ones in devastating tragedies?

To achieve success on this journey, the issue of climate change must be taken seriously within football through the adoption of preventive measu-

res and regulation. Instead, the path to a greener football future seems to be heading in a different direction with future World Cups en route to get bigger. The 2026 and 2030 men's tournaments are set to be hosted across multiple continents with more teams.

But football belongs to the Brazilian people, and as the popular saying goes: "I am Brazilian, and I never give up."

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