

Climate Crisis and the Sports Industry in Ghana: Challenges, Responses, and Future Prospects

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Abstract—Background: The issues about climate change in Ghana are an open secret for all and sundry to experience. The known sports sectors in Ghana face a significant threat from climate change. The temperature increases, rainfall patterns distort, and changing weather patterns, announced by the Ghana Meteorological Agency and researchers such as Owusu & Waylen (2009), are situations that continually distort sports events. Undoubtedly, our sports community is an agent that contributes to our environmental pollution through media such as energy-intensive practices, often travelling, and unsustainable event management.

Objective: This study examines the two-way connection between climate change and the sports business in Ghana. The study seeks to find out how climate change influences sports infrastructure and activities, and at the same time, measure how sports operations add to Ghana's environmental constraints.

Method and Materials: The study adopted a qualitative research approach, and in-depth interviews with core stakeholders in sports, such as environmental scientists, sports professionals, and event organizers. The study adopted thematic analysis to draw out patterns and insights from the data gathered.

Findings: The study findings indicated that climate change has disrupted many key sports events, including the National Sports Festival and local sports competitions, due to infrastructure damage and bad weather conditions. The use of diesel generators and poor waste management practices are identified as unsustainable practices within the business, adding to the environmental problem at hand today. Although these problems exist, this study zeroes in on strategic initiatives, including the National Climate Change Policy (NCCP) and the Ghana Green Sports Project, that present an avenue for sustainability.

Conclusion: The findings emphasize a detailed, interdependent connection between climate change and the sports business in Ghana. While the sports sector is vulnerable to climatic influence, it again adds to environmental issues, emphasizing the need for systemic reform.

Recommendation: The study recommends integrating climate-adaptable strategies as well as environmental sustainability strategies into sports organizations, planning and development. It is believed that leveraging sports as a conduit for climate endorsement and public consciousness can promote wider common commitment in climate operations.

Index Terms— “climate change”, “sports industry”, “sustainability”, “environmental impact”, “athlete health”, “climate policy”.

I. INTRODUCTION

1.1 Background:

Undoubtedly, Ghana's sports sector, which has been applauded for its ability to unite varied communities and resonate with their culture, is now becoming integrated with the nation's multiple environmental challenges. The industry, which was once political and environmentally neutral, is now involved in complicit escalating climate challenges, as well as its vulnerability. A lesson can be taken from the cancellation of skiing competitions in Europe due to snow shortages, to the rescheduling of the Tokyo 2020 Olympics to shield athletes from the intense heat influence of climate change is drastically being felt in the world of sports (Scott, Hall, & Gössling, 2012; IOC, 2021). Despite its relatively low emissions, Africa is already negatively affected by climate irregularities, and the sports business is not considered in these calamities. Apart from the increasing heat indices in East and West Africa, there are possible risks posed to athlete health and spectator safety, due to the extreme weather conditions, which some cases, disrupt stadiums in South Africa, Kenya, and Nigeria (IPCC, 2022; Knaus, 2019).

As a matter of urgency, the climate change issues in Ghana are no mean theoretical concept; it is evident in all spheres of sports, for example, on football fields, practice facilities, and parks. Already, Ghanaians are facing climate challenges such as rising sea levels, heatwaves, irregular rainfall, and protracted droughts, which are serious problems for Ghana and many other sub-Saharan African nations (Owusu & Waylen, 2009; Environmental Protection Agency [EPA], 2020). In addition to the issue of climate change challenges affecting important national sectors such as agriculture and water supply, these changes are also having a significant negative impact on social and cultural institutions such as the sports industry.

This study examines the complicated and mutually strengthened connection between Ghana's sports industry and the ongoing climate change issues, depicting the industry as a victim of ecological degradation. On a very serious note, climate change challenges are causing serious infrastructural damage and interfering with sporting activities. In the urban areas where flooding is common, sports facilities have been negatively impacted by this phenomenon, especially areas such as Accra, Kumasi, and Sekondi-Takoradi, where there are challenges with modern drainage systems and also experience increasing rainfall patterns (Amoako & Boamah, 2015; Ghana Urban Floods Study, 2021). Our sportsmen and women, especially those who take part in high-intensity sports such as football, athletics, and cycling, are at very serious risk for health challenges due to the rising temperatures, in the dry seasons and early rainy seasons (Asare & Addo, 2021). Due to continuous exposure of our sportsmen and women to high temperatures created by climate change, there are several cases of heat-related illnesses and dehydration during training and games reported. Furthermore, several matches have been postponed or cancelled due to wet fields, which are commonly found in the Ghana Premier League (Ghana Football Association [GFA], 2022).

However, one cannot turn a blind eye to Ghana's sports industry's environmental influences. The very ways the sports industry contributes to climate change in terms of greenhouse gas production are through regular travels for matches and tournaments, stadium activities, where energy is required, as well as the usage of diesel generators for power to media activities in areas with electricity power outages

(Mensah, 2020). In addition, sports activities always produce greater levels of unwanted waste, such as non-biodegradable packaging and plastics, which can contaminate the nearby environments and waterbodies (Boateng, 2018). Lessons are drawn from recognized major athletic events such as the Olympics and FIFA World Cup, which came under criticism for their significant carbon footprints despite sustainability commitments; this is not only the two major institutions but also reflects a concern around the world (Collins et al., 2009; UNEP, 2019).

A critical duty of African sports in climate discussions is to be recognized by scholars and policymakers on a continental level. For example, after the 2010 FIFA World Cup, South Africa began to set up regional standards for environmentally friendly sports initiatives by integrating sustainability measures into the planning and organization of sporting encounters (Swart & Bob, 2012). It is worth noting that issues of the environment are somewhat grossly downplayed in the sports-related policies, planning, and organization in many other African countries, including Ghana. Although these countries know the implications of climate issues, Ghana's National Climate Change Policy (NCCP) does not offer strong and direct recommendations for the sports industry (Ministry of Environment, Science, Technology, and Innovation [MESTI], 2013).

Given this, the study highlights how pressing Ghana's sports development agenda needs to add environmental stewardship and climate resilience. It also aims to portray the need for sustainable reforms and workable programmers that consider sports facilities and practices with Ghana's climate integration objectives by examining the sector's environmental weaknesses and contributions. Conversely, it indicates, however, that the sports industry has not realized its potential as a platform for behavior change, education, and climate advocacy using its major social network and cultural influence. This can be whipped in line with the international structure, such as the United Nations Sports for Climate Action Framework, which requests sports organizations to make frantic efforts in promoting sustainability, cut emissions, and use their platforms to communicate about climate change issues (UNFCCC, 2018; UNEP, 2019).

By exploring these connections, the study may put the Ghanaian sports industry in a proper position to

strategically influence climate change issues and play a pivotal role in promoting environmental adaptability and last forever.

1.2 Research Objectives

To inform sustainable practices, policy reforms, and stakeholder engagement, the main goal of this study is to investigate the dynamic and reciprocal relationship between Ghana's sports business and climate change. Specifically, the study seeks to:

1. Examine the effects of climate change on infrastructure, athlete health, event schedules, among other facets of Ghana's sports industry.
2. Examine how much Ghana's sports sector contributes to environmental deterioration, with emphasis on emissions, energy consumption, waste, and transportation.
3. Evaluate stakeholders' attitudes to climate change for better environmental sustainability in the sports community.
4. Determine possible policy suggestions to mitigate climate change in the Ghanaian sports industry.

1.3 Research Questions

To address the above objectives, the study is guided by the following key research questions:

1. What are the effects of climate change on infrastructure, athlete health, event schedules, and other aspects of Ghana's sports industry?
2. How does Ghana's sports sector contribute to environmental degradation, with respect to emissions, energy consumption, waste generation, and transportation?
3. What are the attitudes and perceptions of key stakeholders within Ghana's sports community toward climate change and environmental sustainability?
4. What policy recommendations can be proposed to mitigate the impact of climate change on Ghana's sports industry?

1.4 Statement of the Problem

Despite the numerous challenges in the world today, the degrading effects on ecosystems, infrastructure, livelihoods, and human health, climate change issues have become the topmost global concern (IPCC, 2022). Perhaps the sports industry, which was once seen as having little impact on climate change, is now accepted for its role in ecological damage and

vulnerability to climate change. This is evident as severe weather patterns, including heat waves, floods, and air pollution, have disrupted major international sports competitions such as the Summer Olympics, FIFA World Cup, and the Tour de France. This phenomenon has called for a collaboration where international organizations such as the United Nations and the International Olympic Committee (IOC) are now pushing for more strategic, environmentally conducive sports programmers (IOC, 2021; UNEP, 2019; UNFCCC, 2018). Even though sports unite a large number of people for inclusivity and health awareness, climate issues have generated a hidden conflict in the industry. This is because many severe cases of climate change issues already exist in Africa, destroying social structures and infrastructure. Someone may say that this contributes very little to global emissions challenges, but the fact is that African countries are extremely vulnerable to the various climate risks (IPCC, 2022). These climate challenges, including harsh weather conditions, have destroyed most outdoor sports facilities, deteriorated many athletes' health, and rescheduled most sports competitions and marathons in areas such as South Africa and Kenya (Swart & Bob, 2012; Knaus, 2019). One would advocate that the national and continental struggle to develop sports infrastructure is growing; however, the negative environmental influence on sports is still not well understood in many parts of the continent, including Ghana. The African Union's Agenda 2063 stresses the integration of climate-resilient infrastructure into the development agenda, yet the Ghanaian sports industry remains a bit silent in these deliberations.

Meanwhile, it is obvious that the harsh nature of the climate crisis is noticeable in Ghanaian settings, in areas with high temperature rates, irregular rainfall patterns, frequent flooding, and the severe dry season in the north are major problems facing the nation (Owusu & Waylen, 2009; EPA, 2020). This is a devastating challenge because the northern part of Ghana serves as a food basket for the nation. Any harsh climatic condition can cause famine to the nation and beyond. The sports industry seems neglected in this all-important environmental conversation, despite the national frameworks such as the National Climate Change Policy (NCCP) and the Environmental Protection Agency's (EPA) dream of integrating climate adaptation and environmental sustainability in

all sectors (MESTI, 2013; EPA, 2020). Considering a nation where sports are the lifeblood of the people, public entertainment, national identity, and economic activity, it then becomes a critical sector to be embraced in all conversations.

It is alarming to observe and hear that Climate change is negatively impacting the Ghanaian sports industry. Surprisingly, areas such as Takoradi, Koforidua, Kumasi, Accra, and Cape Coast simultaneously face game disruptions and field damage due to flooding, while the sportsmen and women continually face harsh heat stress conditions during training and competitions (Asare & Addo, 2021). The local sports, organized in open venues, are not excluded from these challenges, this is because the vulnerability, such as irregular weather patterns, reduces participation and increases facility damage (Amoako & Boamah, 2015). These disruptions damage sportsmen and women's safety and the economic sustainability of sports programmers.

It is worth noting that the Ghanaian sports industry causes environmental damage through the regular travels for competitions, which in the end produce emissions from vehicles, with no effective strategies to offset carbon emissions. Also, due to irregular power outages, some stadia use diesel generators, thereby producing greenhouse gases and pollutants to harm the environment (Mensah, 2020). Another challenge faced by the sports industry is the poor waste management system during sports events in areas where sanitation infrastructure is lacking, in effect damaging the environment (Boateng, 2018). What eventually adds up to the problems is the import of non-biodegradable sports gear, often without regulatory checks also compounds the problem.

As a matter of fact, in all these strenuous situations, Ghana's known sports bodies, such as sports councils and the Ghana Football Association (GFA), seem to lack formal climate-friendly policies to help avert some of these challenges. The situation can be attributed to the limited awareness, weak regulation, and weak financial support to bring major stakeholders on board for effective resolution. The irony of it is that most sports administrators choose immediate logistical needs over long-term sustainability plans, hindered by funding gaps and a lack of strategic guidance (Agyeman, 2019). This, however, may come as a result of the ignorance of mutual interaction in climate adaptation and sports development policy due to insufficient data and research.

This, in the end, breeds a vicious cycle where the sports sector either contributes to or, in effect, suffers from climate change. It is for this reason that the study seeks to examine the climate crisis in Ghana's sporting Industry. It aims to provide insights for integrating environmental sustainability into sports governance in Ghana to contribute to the broader conversation on climate sports integration.

1.5 Significance of the Study

Analyzing the harsh effects of climate issues on sports infrastructure, athlete health, organization interference, rescheduling of games, and participation, it is obvious that climate change hurts Ghanaian sports through the rising temperatures, unpredictable rainfall patterns, and harsh weather conditions. This study explores the reciprocal connection between climate change and the sports industry in Ghana, where sports are part of our social cohesion, economic growth, and national identity. At the same time, greenhouse gas emissions, energy-intensive operations, and improper waste management are some ways the sports industry contributes to environmental degradation (UNEP, 2019; Mensah, 2020). The study provides varied significance at the managerial, conceptual, practical, and policy levels by examining this intricate relationship.

Practically speaking, the study offers evidence-based insights into how Ghanaian sports organizations and infrastructure are negatively impacted by climate change. For example, regularly flooding at stadia in flood-prone areas such as Accra and Kumasi, postponing fixtures due to malfunction and damage to facilities (Amoako & Boamah, 2015). As well as drawing attention to heat exhaustion, especially on open, unprotected fields that are typical in Ghana (Asare & Addo, 2021), to protect athlete health and event viability, these real-world issues highlight the urgent need for adaptive measures, such as heat action protocols, flood-resistant infrastructure, and sustainable transportation.

Again, for the sports industry to notice the carbon-emitting practices of the sports industry, in the form of regular travels and the act of depending on diesel generators, this study equips stakeholders with basic solution strategies to mitigate the challenges. Strategies such as the use of circular waste systems during sports activities, short-distance travels for fixture scheduling to reduce long travels, and possibly

installing renewable energy systems in stadia (UNFCCC, 2018).

From a conceptual point of view, this research contributes to the literature on how sports and climate change interact in developing countries. With a disproportionate emphasis on major events like the Olympics and FIFA World Cup, the majority of the literature on this subject is concentrated in the Global North (Collins & Cooper, 2020; McCullough et al., 2020). Through this optic lens, Ghana's sports can be positioned as a sector that needs to be protected from climate risks and a platform needed for sustainability advocacy to influence policies, values, and behaviors in larger communities (UNEP, 2019).

From Managerial Implications, the results provide strategic guidelines for operational sustainability for administrators, event organizers, and sports managers. Although Ghana's sports governance frameworks have not accommodated this practice, the research recommends the need to integrate environmental impact assessments into sports organizations, planning, and facility management (Agyeman, 2019). In other words, this study can be of importance to managers of organizations, especially the Ghana Football Association (GFA), National Sports Authority (NSA), and regional sports councils, to help create green standards for sports events, such as energy-efficient technologies and low-waste policies. Also, it may help to create training materials on climate-related risks for coaches and athletes. Here could also be sustainability audit concerns in the competition's operational procedures. Finally, it could be used to invite public-private partnerships to fund an environmentally friendly infrastructure through low-cost interventions, such as community recycling programmers, due to the tight budgets of the institutions. From a policy standpoint, this study champions domestic and global environmental issues, especially the Sustainable Development Goals (SDGs) and Ghana's National Climate Change Policy (NCCP). By showing how sports can incorporate grassroots and institutional efforts to mitigate and adapt to climate change, it reaffirms the importance of SDGs 13 (Climate Action) and 11 (Sustainable Cities and Communities).

The study may also draw attention to the lack of regulations of environmental standards in Ghana's sports industry. It will enable climate risk assessments to be infused into sports development policies, and

ministries such as the Ministry of Youth and Sports, the Ministry of Environment, Science, Technology, and Innovation (MESTI), and local municipal assemblies would create and implement a green building standard for new sports facilities and as well incorporate sports into national climate communication strategies, using their widespread appeal to encourage public awareness and behavioral change. It could also help to provide funds for research and capacity building on climate change adaptation in sports (UNFCCC, 2018). In addition, the results of this study can help shape the African Union's Agenda 2063 at the continental level, which prioritizes sustainable urbanization and resilient infrastructure but silently mentions sports in its climate priorities (African Union Commission, 2015).

In terms of advocacy and Educational Significance, this study will be a call to action for environmental organizations, athletes, fans, and civil society groups. Athletes may have a great opportunity to diffuse climate messages as powerful role models, especially among the youthful generation. This could inspire new international movements that seek to embrace sports communities to support environmental issues, such as the UN Sports for Climate Action Framework and the "Playing for the Planet" initiative (UNEP, 2019; UNFCCC, 2018).

A new generation of environmentally alertness for sports individuals can be produced by integrating the findings into the Ghanaian University Sports Association and environmental management programmers. In conclusion, this study's importance goes beyond scholarly research. It offers a thorough, multidisciplinary understanding of Ghana's climate-sports relationship, with significant ramifications for theory, practice, and policy. Through the integration of environmental science, sports management, and public policy, the study establishes sports as a crucial, albeit underutilized, arena in the battle against climate change.

1.6 Delimitations

The study area is Ghana, with a focus on urban and peri-urban areas such as Accra, Kumasi, Takoradi, and Tamale. These are the areas with the highest concentration of organized sporting activities with identified levels of climate-related effects in the form of heatwaves and flooding. (Owusu & Waylen, 2009; EPA, 2020). This study's main lens is on Ghana, yet

constant comparisons will be made with other contexts for comparative analysis. Also, the literature for this study was reviewed from 2000 to 2024 to depict the development of climate-related sports impacts over the past 20 years, together with the expanding works of climate research in Ghana. The study focused on sectors such as the professional football leagues, for example Ghana Premier League, Ghana University Sports Association (GUSA), national competitions such as National Sports Festivals and unity games, as well as the semi-professional clubs that organize sports competitions are the focus of the study.

II. LITERATURE REVIEW

2.1 Introduction

In Ghana, climate change is identified as one of today's main challenges, with damaging effects for all aspects of society, including the sports industry. Although sport is always seen through cultural, recreational, and economic lenses, its connection with environmental change is gaining profound scholarly and policy attention. In the world over, the sports industry is confronted with numerous climate-related risks, some of which are harsh temperatures, floods, air pollution, and water shortages, which threaten both the continuity of events and the health and safety of individuals in the sports ecosystem, such as the athletes and spectators. Considering places such as Europe, Asia, and Australia, high-profile disruptions from typhoons, including one that affected the Rugby World Cup, to bushfire smoke during the Australian Open, indicate the increasing vulnerability of sports to climate extremes.

In Africa, these weaknesses are increased by infrastructural deficits, limited adaptive capacity, and weak policy frameworks. Countries such as South Africa, Kenya, Nigeria, and Ghana experience constant shifts in weather patterns that affect sports competitions at all levels. It is no surprise that Ghana is now confronting the tangible impacts of climate change on its sports ecosystem, such as the increasing temperatures, irregular rainfall patterns, field flooding, and unsafe training conditions, particularly in the flood-prone areas.

However, the link between sports and the environment is multifaceted. This is evidence is the situation where anytime sports suffer as a result of climate change consequences; the same sports contribute to

environmental degradation. These happen as a result of some events and everyday sporting activities, which generate a certain amount of carbon emissions, waste, and pollution. The areas that contribute immensely to Ghana's environmental challenges include regular travels by teams, improper waste management education, unsustainable practices in the various stadia, and other activities that worsen the sector's environmental footprint.

Judging from this point of view, it seems that the industry considers environmental issues, but its sustainability has a small limit in Ghana's sports policy framework. As the developed countries have accepted green protocols and environmental audits, the Ghanaian sports institutions are yet to fully deal with the environmental challenges. This gap points to an urgent need for integrated strategies that bring sports in line with the global climate issues and their sustainability.

This study's however, is to charge Ghanaian sports with dual responsibility in terms of becoming a victim of climate challenges and at the same time a contributor to fueling climate change issues. The study also seeks to find out the basic environmental challenges facing the sports industry, examine the present mitigation measures for adaptation, and try to find the policy gaps that serve as a hurdle to sports' sustainable development in Ghana. This will help contribute to a growing body of scholarly works pushing for climate-friendly as well as best environmental sports operations in Ghana and beyond.

2.2 The Impact of Climate Change on the Sports Industry

Globally, there have been many concerns about how vulnerable the sports industry is to climate change challenges. This is because most outdoor sporting activities are constantly being disturbed by climate-related challenges, some of which are excessive heat, drought, flooding, and air pollution (UNEP, 2019; McCullough et al., 2020). Some sporting activities, such as football, skiing, and athletics, have faced many setbacks in Europe. For example, most economies that rely on winter sports tourism severely suffered as a result of the closure of ski resorts in Switzerland and Austria because of snowmelt in the Alps (Scott et al., 2008). Another situation is the Typhoon disruptions during the 2019 Rugby World Cup in Japan, which

also raised global concern about the event's readiness and safety (IOC, 2020).

In addition, severe heat and bushfire smoke during the 2020 Australian Open in Australia attracted health concerns for athletes, fans, and spectators (Cunniffe et al., 2020). This indicates how vulnerable the sports industry is to climate-sensitive economies, in addition to a cultural practice.

Africa experiences these challenges due to the low adaptive abilities, poor infrastructure, and a lack of emergency readiness protocol that increases the threat of climate change to sports in many African nations (IPCC, 2022). Simpson et al. (2018), opine that the rising temperatures and irregular rainfall patterns in countries such as South Africa, Kenya, and Nigeria disturb their professional and amateur sports competitions.

It is worth noting that severe heat conditions have dictated that Nairobi's athletes train in the early morning or late at night, and this phenomenon has affected their time schedules and performance. Furthermore, in semi-arid sectors such as northern Kenya, water shortages disrupt field maintenance and this negatively impacts the athletes' hydration (Kwarteng & Biney, 2021). Owusu and Waylen (2009) stated that field flooding and heat stress are common due to rising mean temperatures and delayed rainfall onset in Ghana. Asare & Addo (2021) also pointed out that high Wet Bulb Globe Temperatures (WBGTs) during training hours put athletes' health at a high risk in cities such as Accra and Kumasi. (Amoako & Boamah, 2015) also opined that community sports in areas such as Cape Coast and Sekondi-Takoradi experience infrastructure damage as a result of flood-prone and poor drainage, as well as inadequate climate-proofing strategies to mitigate the situation.

In effect, it shows how prudent climate adaptation must be inculcated into sports planning and infrastructure development in Ghana, where sports are a lifeline of the youth social life.

2.2 Environmental Impact of the Sports Industry

The sports industry has been showcased as a vulnerable sector for climate change in the literature. Modern investigations, however, are also bringing out the very negative contributions of environmental deterioration created by the sports industry. This came to light when evidence of carbon emissions was

produced by huge international competitions such as the Olympics, FIFA World Cup, and Formula 1 races. Also, according to research, the 2016 Rio Olympics produced about 3.6 million metric tons of CO₂, mainly from energy use, temporary construction, and international travel (IOC, 2017; Collins et al., 2007). The use of stadia powered by fossil fuels, ineffective waste management, and unsustainable sports items production are some of the means by which global sports and club-level events destroy the environment. This act of environmental damage, because of energy-intensive activities and frequent travel schedules, has put some football leagues in Europe under scrutiny (Dolf & Teehan, 2015).

McCullough et al. (2020) stated that though there is no evidence of many mega-events in Africa, there are emerging patterns appearing, where diesel generators are used to power stadia in Johannesburg, Lagos, and Nairobi, mostly in areas with load shedding or irregular power supply (Simpson et al., 2018). Also, there is mostly large-scale match waste, which ends up in drainage or open landfills, creating pollution and health hazards to the community. These trends are seen in Ghana's sports industry. Mensah (2020) stated that the major sources of fuel-related greenhouse gas emissions during the Ghana Premier League season are the team travel. Boateng (2018) also opined that the absence of organized waste management procedures at stadia such as Accra Sports Stadium and Baba Yara Stadium creates huge tons of litter after matches, and this clogs the drainage systems. Another area of consideration is the increase in carbon cost of synthetic kits, plastic-based goods, and non-biodegradable promotional materials (Agyeman, 2019). The unfortunate situation is that only a few Ghanaian sports organizations are mindful of incorporating environmental sustainability protocols into their daily strategic plans.

2.3 Sustainability Awareness and Policy Gaps

There have been many global sports organization's official sustainability pledges in response to these environmentally damaging issues. These have compelled FIFA and the International Olympic Committee (IOC) to issue guidelines for sustainable travel and logistics, carbon offset programmers, as well as green building codes (IOC, 2017; FIFA, 2020). Orr et al. (2022) stated that in furtherance of this forward-thinking teams such as Forest Green Rovers

(UK) have championed the "eco-sports," reducing their environmental effect with solar energy, plant-based meals, and electric team buses. Although much of this was donor-driven and not maintained after the event, South Africa's 2010 FIFA World Cup was commended for incorporating green technologies such as solar-powered lighting and mass transit promotion at the continental level (Swart & Bob, 2012). This has motivated countries such as Nigeria and Kenya, among other African nations, to look into green accreditation for new stadiums built. Although adaptation and mitigation goals are mentioned in Ghana's UNFCCC commitments and the National Climate Change Policy (MESTI, 2013), the sports industry is not specifically mentioned. This makes sustainability only a minor issue in Ghanaian sports governance, which may be because of financial constraints, a lack of technical know-how, and a lack of awareness.

Agyeman (2019) discovered that local sports administrators frequently put short-term profits ahead of environmental investments in the sports sector. Additionally, Climate education is rarely incorporated into training curricula by Ghanaian university sports faculties and the National Sports Authority (NSA). Youth organizations, non-governmental organizations, and ad hoc partnerships with the EPA, such as the Ghana Green Sports Project, are major forces behind environmental consciousness in sports. Despite their potential, these initiatives are still dispersed and lacking in funding (EPA, 2020).

In conclusion, there is convincing evidence of a reciprocal and unequal connection between climate change issues and the sports sectors in Ghana, Africa, and the rest of the world. Globally, the industry is moving closer to sustainability, but challenging issues such as equity, implementation, and impact measurement still exist. Though the growing vulnerabilities, the response in Africa, and Ghana in particular, are not fully attended to within Ghana's sports ecosystem. This literature reveals critical gaps in stakeholder education, policy inclusion, carbon accountability, and infrastructure adaptability to complement Ghana's development priorities and incorporate best practices from global leaders in sustainable sports required to address these challenges.

2.4 Theoretical Framework

This study is grounded in two key theoretical perspectives: Environmental Determinism and the Theory of Planned Behavior (TPB).

2.4.1 Environmental Determinism

Environmental determinism posits that physical environmental factors, such as climate and geography, exert a strong influence on human activities and societal development. Within the context of this study, this theory helps to explain how Ghana's changing climate is shaping the structure, operations, and viability of the sports industry. Climate-induced disruptions such as extreme heat, flooding, or air pollution are not just incidental but actively influence infrastructure planning, athlete performance, and the scheduling of events. This lens underscores the asymmetrical relationship where the environment has a powerful, sometimes dictatorial role in the sporting sector's continuity and sustainability.

Theory of Planned Behavior (TPB), Ajzen (1991)

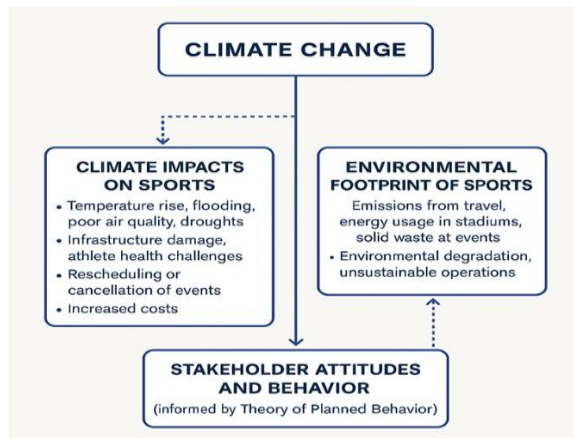
The TPB helps interpret the behavioral and attitudinal dimensions of climate-related actions among sports stakeholders. This theory suggests that individual behavior is influenced by three components:

- Attitudes (toward climate change and sustainability),
- Subjective norms (social pressures or expectations within the sports community), and
- Perceived behavioral control (stakeholders' belief in their ability to influence environmental outcomes).

This framework is essential for analyzing how coaches, athletes, organizers, and facility managers perceive climate risks and their readiness to adopt eco-friendly practices or advocate for policy reform.

2.5 Conceptual Framework

The conceptual framework below illustrates the dynamic interactions between climate change and Ghana's sports industry, structured around three key dimensions derived from the research questions:



2.5.1 Climate Impacts on Sports

The diagram above explains the optic lens I used to direct this study. Firstly, was the climatic impact on sports. In this direction, I considered the temperature rise, flooding, poor air quality, droughts, with the outcomes on infrastructure damage, athlete health challenges, rescheduling or cancellation of events, increased costs, and how these climate conditions impact sports directly. Secondly, I considered the environmental footprint of sports. In this direction, I took into consideration the emissions from travel, energy usage in stadiums, and solid waste at events, water consumption and its outcomes: as environmental degradation, unsustainable operations and drew conclusion that while climate affects sports, sports also contribute to ecological stress. Thirdly, the study considered the stakeholder attitudes and behavior using variables such as knowledge of climate issues, concern about sustainability, willingness to act also with an outcome being the adoption of green practices, policy advocacy, behavior change.

By connecting these Theory of Planned Behavior (TPB) it explains how beliefs, norms, and perceived control drive responses. In conclusion, the environmental determinism and the theory of planned behavior provide a critical outlook by which the connection between sports and climate challenges can be analyzed in the Ghanaian context. This conceptual framework positions Ghana's sports industry within this paradigm to, investigate the threats sports faces and the role it plays in the climate change discussions, to come out with a critical answer to the questions whether the industry is just a victim or a significant contributor of environmental degradation.

III. RESEARCH METHODOLOGY

3.1 Introduction

The Phase presents the research methodology used to examine the climatic challenges faced by Ghana's sports industry. This study is based on the need to find out how the sports industry contributes to environmental degradation using unsustainable practices such as high carbon emissions, waste mishandling, and energy inefficiency, and the impact of climate change on athletes' workload and sports infrastructure in Ghana.

This study also used a qualitative research design to investigate the institutional behavior, policy dynamics, and human experiences. The aim of using the qualitative design is to provide an in-depth understanding of participants' experiences, viewpoints, and interpretations. Creswell & Poth (2018) have identified qualitative research as an easier way to investigate complicated social phenomena. This method seeks to provide a detailed understanding of diverse stakeholders in the Ghanaian sports ecosystem, such as athletes, coaches, facility managers, legislators, and environmental advocates, who interact mostly with climate change. It also seeks to capture the depth of institutional knowledge and the range of stakeholder perspectives regarding climate adaptation and mitigation in the sports industry using structured interviews, document analysis, and thematic coding.

The constructivist epistemology, which maintains that reality is socially constructed and can only be comprehended by interaction with the people and communities experiencing the phenomenon being studied, is also consistent with this methodological approach (Lincoln & Guba, 1985) to inform more localized and practical sustainability strategies that take into consideration Ghana's cultural, institutional, and environmental realities, the research prioritizes context-specific insights. This chapter concludes by summarizing the study's main methodological components, such as the research design, population and sampling strategies, data collection tools, ethical considerations, and data analysis protocols. To maintain the standards of academic rigour and validity and to guarantee alignment with the overall research objectives, each component is thoroughly justified.

3.2 Research Philosophy

The philosophy used for this study is based on interpretivist paradigm, which highlights the importance of understanding the world through personal interpretations that people make of their experiences and deeds (Creswell, 2014; Saunders, Lewis, & Thornhill, 2019). Interpretivism recognizes that reality is socially constructed, dynamic, and context-dependent, in contrast to positivism, which looks for objective truths through measurable metrics. This philosophical approach is appropriate for examining the critical and overlooked issues of Ghana's sports industry and climate change challenges. The aim of interpretivism is based on the idea that participants and researchers work together to co-create knowledge (Lincoln & Guba, 1985). This is in line with the objectives of this study, which aims to understand how various stakeholders, such as coaches, athletes, facility managers, environmental specialists, and legislators, respond to sports' roles as contributors to climate change and victims of environmental degradation. To be able to ascertain the Ghanaian context needs a better understanding of how the local environmental realities, institutional cultures, and social priorities help shape these experiences is needed. The use of this interpretivist lens makes the study put much weight on depth rather than breadth, facilitating the investigation of various viewpoints and situated knowledge that are impossible to fully capture using only quantitative metrics. Such as how a football coach perceives heat stress on players or how a regional sports officer interprets flooding events that affect community fields.

Again, the use of interpretivism enables the full use of qualitative techniques that are perfect for revealing the subjective, emotional, and value-laden aspects of climate-related issues in sports, such as structured interviews and thematic analysis. This will also ensure that power dynamics, institutional inertia, and cultural values that may influence or obstruct sustainable practices in the sports ecosystem are critically examined with the help of this method. These components are all important for ensuring context-specific and responsive strategies for climate adaptation and mitigation within Ghana's sports culture.

3.3 Research Design

The connection between Ghana's sports industry and climatic issues was examined in this study using a qualitative exploratory research design. This was as a result of scholarly research in this sector being very limited, especially in sub-Saharan Africa. Agyeman (2019; Boateng, 2018; Bryman, 2016) stated that this design is good for gathering contextually rich, inductively derived insights. Stebbins, (2001) also stated that where a field of study is poorly understood, the exploratory design is necessary due to the fact that researchers can look beyond the box and investigate serious social and environmental issues without being limited by any type of theoretical frameworks. I chose the exploratory approach because in the Ghanaian context, climatic variability constantly limits sports events, while institutional, infrastructural, and behavioral responses are also scattered; therefore, this provides the study with the flexibility needed to adapt to new findings and respondent-led insights.

Once this study's base is on interpretivist research philosophy, it provides a qualitative exploratory study with constructivist epistemological roots. By focusing on how stakeholders conceptualize and understand the sustainability issues and climate negative impact for strategic solutions, the design gives a systematic approach in reality.

The ability of this design to provide detailed in-depth explanations of institutional, social, and cultural contexts where climatic-sports engagements take place was the reason behind its selection (Geertz, 1973). (Asare & Addo, 2021; Amoako & Boamah, 2015) identifying how flooding affects grassroots sports events in low-income urban communities, as well as high temperatures affecting training schedules and sportsmen and women's health outcomes, are the challenges of environmental damage that need to be solved.

There is evidence of scholarly works in the world that have adopted the same qualitative exploratory design to investigate relationships between climate and sports in contexts ranging from Europe and North America's heat-impacted competitions to Australia's wildfire-affected regions (UNEP, 2019; Cuniffe et al., 2020). Meanwhile, Africa's situational realities, such as poor policy administration and poor infrastructure concepts, demand a localized research study to inform Ghanaians of the specific interventions needed (IPCC, 2022; Kwarteng & Biney, 2021).

3.4 Research Strategy

The study adopted a qualitative research methodology that used semi-structured interviews and document analysis to help investigate the critical connection existing between climate change and the Ghanaian sports ecosystem. The purpose is to help collect thorough, rich data from varied stakeholders and relate their experiences to the existing institutional frameworks, if there is any. Semi-Structured Interviews The primary method of data collection was semi-structured interviews with a carefully selected sample of stakeholders from the environmental and sports sectors. This method was chosen due to its flexibility and ability to balance structured research with the openness needed to uncover hidden themes and deeper understandings (Kallio, Pietilä, Johnson, & Kangasniemi, 2016). The interview guide's objectives were to gather more information about the institutional roles, perceived challenges, firsthand accounts of stakeholders' experiences with climate impacts on sports, and recommendations for sustainable practices. Participants included professional athletes, coaches, sports facility managers, environmental scientists, event coordinators, and lawmakers from groups such as the Ghana Football Association (GFA), the Environmental Protection Agency (EPA), and local sports councils. This purposive approach ensured that the data represented a broad range of insights, from institutional policymaking to grassroots realities (Palinkas et al., 2015). Semi-structured interviews are particularly helpful for research based on an interpretivist paradigm because they allow respondents to express their opinions in their own words. This makes it possible to examine meanings and experiences related to the complex topic of climate change and sport in greater detail (Creswell, 2014). This method also makes it easier to ask iterative questions, which enables the researcher to resolve ambiguities and immediately follow up on fresh data.

3.5 Document Analysis

A review of relevant policy and strategic documents that impact the climate response and working conditions of Ghana's sports sector was carried out to support the interviews. Among the key documents were the Ghana Football Association's (GFA) strategic plans, the Environmental Protection Agency's (EPA) reports, and the Ghana National Climate Change

Policy (NCCP) (Ministry of Environment, Science, Technology and Innovation [MESTI], 2013).

Placing stakeholders' viewpoints within the formal frameworks and institutional narratives that oversee environmental sustainability and sports governance is the aim of document analysis (Bowen, 2009). By helping to identify existing gaps, strengths, and opportunities in policy alignment and implementation, it offers a more thorough understanding of systemic enablers and barriers. By integrating data from interviews and document analysis, the study completes methodological triangulation, enhancing the validity and dependability of the findings (Denzin, 1978). This combined approach allows for an integrated view of both lived realities and institutional responses, facilitating a comprehensive understanding of the ways in which climate change and sports interact in Ghana.

3.6 Research Approach

This study used an abductive reasoning approach, which blends elements of both inductive and deductive logic, to generate and enhance theoretical insights based on empirical observations (Saunders, Lewis, & Thornhill, 2019). Abduction is particularly well-suited for examining complex, context-dependent phenomena where existing theories might fall short, such as the connection between Ghana's sports sector and climate change. The research process was grounded in empirical observations, such as football games being cancelled because of bad weather and stadiums without adequate drainage systems.

These seeming challenges led to an iterative investigation that used participant narratives collected from semi-structured interviews and document analysis of policy frameworks to explore systemic patterns and underlying causes.

Unlike deductive approaches that test preconceived hypotheses or purely inductive approaches that develop theory solely from data, abductive reasoning enables a dynamic transition between data and theory (Tavory & Timmermans, 2014). This back-and-forth process helps to develop conceptually meaningful and contextually valid explanatory models.

Using the abductive approach, the researcher was able to:

- Iteratively revise research questions and frameworks based on ongoing data collection and analysis;

- Interpret findings in light of contemporary theories of climate change and sports management to comprehend wider implications;
- Identify new themes emerging from stakeholder experiences that were not expected in the original literature review.

The study closes the gap between theoretical concepts and empirical realities by using abduction, offering a deeper, more useful understanding of how climate change impacts and is influenced by Ghana's sports sector.

3.7 Research Instruments

The two primary research instruments utilized to gather comprehensive and nuanced data on the connection between Ghana's sports industry and climate change were a structured interview guide and a document review protocol.

A structured interview guide was carefully designed to ensure consistency throughout interviews while allowing participants to freely elaborate on topics relevant to their individual backgrounds and areas of expertise. Major themes were used to organize the guide, including:

Observed Climate Change Effects on Sports: Studies intended to gather firsthand accounts of how extreme weather events, shifting weather patterns, and environmental factors have affected infrastructure, athlete health, event scheduling, and athletic activities.

Perceptions of Environmental Responsibility: An examination of participants' views on the sports industry's responsibility and role in environmental stewardship and climate action.

Institutional Strategies for Climate Adaptation and Mitigation: Look at the policies, programs, or practices that are currently in place at an organization or governing body to address climate change issues in This semi-structured format allowed the researcher to explore new subjects in greater detail and adjust questions according to the interviewee's background, resulting in richer, more contextualized data (Kallio et al., 2016).

3.8 Document Review Protocol

To augment interview data, a systematic document review protocol was developed to look through relevant organizational and policy documents. This process acted as a manual for locating and gathering information regarding:

(1) References to environmental sustainability pledges and values within the sports industry. (2) Outlines climate adaptation tactics relevant to sports infrastructure and event planning. (3) Plans or initiatives that promote energy efficiency, waste management, lowering carbon emissions, or green infrastructure. (4) Plans or institutional guidelines that show how climate change concerns are integrated into sports governance

Publications from regional sports councils, EPA reports, Ghana Football Association (GFA) strategic plans, and national policies such as the Ghana National Climate Change Policy (MESTI, 2013) were among the documents analyzed. The protocol facilitated the thematic comparison of interview results by ensuring a comprehensive and consistent approach to document analysis (Bowen, 2009).

3.9 Sampling and Sampling Procedure

Participants and the Sample Frame in the Sampling Process

The study focused on a broad range of stakeholders who were either directly involved in or knowledgeable about the connection between sports and climate policy in Ghana. The sample frame included individuals holding important roles in environmental governance, sports administration, and advocacy networks. Particularly, participants were chosen from the following categories:

1. Officials from the Ghana Football Association (GFA): Significant figures in charge of directing and planning football-related events at the national and regional levels.
2. Planners for the National Sports Authority: Those responsible for planning events and building sports facilities.
3. Public stadium managers: These people oversee venues such as the Accra Sports Stadium and Kumasi Sports Stadium and are aware of the challenges posed by climate change in terms of operations.
- **Environmentally Active Athletes:** Prominent athletes who actively promote sustainability and climate change awareness both within and outside of the sports industry.
4. Organizers from Ghana University Sports Association (GUSA).

5. Policy specialists from the Ministry of Environment, Science, Technology, and Innovation (MESTI).
6. Environmental Protection Agency (EPA): professionals tasked with creating policies for climate change.

This large participant pool was intended to capture a wide range of perspectives, from policy formation to activism and on-the-ground sports operations.

3.10 Sampling Technique

A purposive sampling technique was employed to specifically select participants based on their knowledge, applicability, and ability to provide rich, insightful data about the study phenomenon (Palinkas et al., 2015). The selection criteria gave preference to those who have firsthand knowledge of the effects of climate change on sports and environmental sustainability initiatives within Ghana's sports ecosystem, or who have the authority to make decisions on these matters.

In order to increase the number of participants and reach informants who were hidden or challenging to reach, snowball sampling was employed (Noy, 2008). The original respondents recommended additional stakeholders whose involvement or knowledge aided in answering the research questions. It was possible to ensure that various voices from various institutions and regions were heard using this method.

A. Sample Size

A total of twenty participants were interviewed; this was thought to be a sufficient sample size to achieve data saturation, which is the point at which gathering more data does not reveal any new themes or insights (Guest, Bunce, & Johnson, 2006). The sample displayed diversity in several domains, including managerial, administrative, athletic, and advocacy roles are examples of institutional roles. Participants were chosen from major urban centers such as Sunyani, Tamale, Accra, Koforidua, Kumasi, and Takoradi to represent the diverse environmental and infrastructure contexts of these cities. Professional athletes, semi-professional athletes, legislators, and environmentalists are among the groups that participate in sports.

This varied sample allowed for a thorough examination of the complex relationship between Ghana's sports sector and climate change.

B. Trustworthiness

Making sure the study meets the rigour and required standard of this qualitative study, the guidelines for research trustworthiness were followed to agree with Lincoln and Guba (1985). On credibility, member-checking was used in the study to increase credibility by distributing interview summaries and preliminary interpretations to participants for their approval and input. This process helped to verify the accuracy of the data and ensured that participant perspectives were appropriately represented. Also, in order to facilitate the application of the results beyond the specific study context, a detailed contextual description of the research settings, participant backgrounds, and environmental conditions were provided. These thorough explanations help readers to assess the findings' generalizability to other similar circumstances. Furthermore, to maintain an organized and transparent record of all methodological decisions, the following were adhered to: data collection strategies and analytical stages. The study produced an audit trail. This documentation supports the long-term consistency and repeatability of the study approach. Finally, to minimize researcher bias and increase objectivity, the data were cross-checked against official reports, policy papers, and strategic plans. This cross-verification improved the validity of the conclusions drawn by confirming multiple data sources.

By using these reliability strategies, the study ensures that its findings are accurate and important in the complex relationship between climate change and sports in Ghana.

C. Ethical Considerations

To ensure that all research operations followed recognized ethical guidelines for studies involving human subjects, the relevant institutional review board granted ethical approval for this study. Before data was collected, participants were fully informed about the purpose, nature, and extent of the study. This contained an explanation of the objectives of the study, the fact that participation was entirely voluntary, and the types of data that would be collected.

After being fully informed that their participation in the study was entirely voluntary and that they could withdraw at any time without facing any consequences, all participants provided their informed consent prior to the interviews. To protect participant

privacy, strict measures were implemented to maintain anonymity and confidentiality.

During data transcription and reporting, identifying information was either securely anonymized or not recorded to ensure that individual responses could not be linked to specific participants.

All collected data was securely stored in password-protected electronic files that were only accessible by the research team. The data was used exclusively for academic and research purposes, and no personal information was shared with third parties. In order to minimize participant discomfort or potential harm and maximize the research's societal value, the study also adhered to ethical standards such as beneficence, justice, and respect for persons.

These ethical guidelines enhanced the validity and reliability of the study's findings by promoting openness and confidence among participants.

IV. FINDINGS

4.1 Introduction

This chapter presents the study's findings, which were gathered through in-depth semi-structured interviews with 20 important stakeholders who were especially selected to represent Ghana's environmental and sports sectors. Participants include athletes, sports administrators, environmental experts, and lawmakers, whose viewpoints shed light on the complex interrelationship between Ghana's sports industry and climate change.

The results are thematically organized according to the study's primary research questions, allowing for a clear consideration of how climate change impacts the sports industry, how the sports sector contributes to environmental challenges, and stakeholder perceptions of sustainability and climate action.

A comprehensive thematic analysis process was employed to systematically identify, code, and interpret recurring concepts and patterns in the qualitative data. Every theme has a companion.

4.2 Participant Overview

A total of twenty participants took part in the study, representing significant stakeholder groups in Ghana's environmental and sports sectors. The composition of the sample was as follows:

Officials from the Ghana Football Association (GFA): Four senior administrators who plan events and draft policies.

Senior Staff of the National Sports Authority (NSA): Three individuals in charge of planning, infrastructure, and sports development.

Athletes: Four current athletes who participate in football, swimming, and track and field; some of them also support environmental causes; stadium facility managers: two managers in charge of upkeep and operations at significant sports complexes in Kumasi and Accra.

Environmental Officers: Three specialists from the Environment, Science, Technology, and Innovation Ministry (MESTI) and the Environmental Protection Agency (EPA) provided information on national climate laws and policies. Civil society representatives: Four members from the Ghana University Sports Association (GUSA). A thorough understanding of how climate change and sports intersect across various institutional contexts is provided by the sample's balanced representation of both public and private or non-governmental organizations. A thorough, multifaceted investigation of the study's themes was made possible by the varied participant profile, which captured a range of experiences and

4.3 Climate Change Impacts on Sports in Ghana

Theme 1: Disruptions to Sporting Events and Schedules

A common theme in the interviews was the significant disruption to training schedules and sporting events caused by increasingly erratic weather patterns. Every participant emphasized how climate change's effects, such as intense heat and heavy rains, are altering how sports are conducted in Ghana. Facility managers and sports officials specifically emphasized the challenges posed by flooding during the rainy seasons, which typically occur from May to July and again from September to October. Matches have frequently been postponed or cancelled due to flooded and waterlogged fields, creating logistical problems and financial losses.

“During the last league season, we had to cancel two matches in Kumasi because of the rain. The pitch was just waterlogged and dangerous for players.” (Facility Manager, Kumasi)

These findings were supported by athletes, who explained how intense heat waves interfere with regular training schedules, particularly in crowded cities like Accra. In order to avoid the afternoon heat, which can cause dehydration and heat exhaustion, training sessions are frequently rescheduled to early mornings or late evenings.

“By 2 pm, the heat is unbearable. We’ve started shifting our training to early morning or evenings.” (Female Sprinter, National Team)

These disruptions have broader effects on spectator attendance, athlete performance, and event planning. Participants expressed concerns about the cumulative impact on the competitive calendar, with some saying that the lack of adequate climate-resilient infrastructure may put Ghanaian sports' continuity and quality at greater risk.

Theme 2: Sports Industry's Contribution to Environmental Degradation

Carbon Emissions from Travel and Infrastructure

Regarding the environmental effects of Ghana's sports industry, many participants were forthright and honest, pointing out that transport and infrastructure are two significant contributors to carbon emissions.

Domestic travel was identified as a significant contributor to greenhouse gas emissions during football seasons. In contrast to international mega-events with numerous international flights, Ghana's sports teams typically travel by road, often in antiquated, fuel-inefficient buses. The frequent interregional movement of several teams adds up to a substantial carbon footprint.

“Most teams travel by road, and our buses are not fuel-efficient. You can imagine the impact when 18 clubs are moving every week.” (GFA Official)

Stadium infrastructure is another important aspect of the industry's environmental impact. Because power outages are frequent in some areas of the country, stadiums primarily rely on diesel-powered standby generators to maintain lighting and other essential functions, especially during evening matches. This dependence on fossil fuels increases local pollution and carbon emissions.

“We have standby generators that run on diesel. Without them, evening matches wouldn't be possible.” (Stadium Operations Officer, Accra)

The combination of these factors draws attention to a systemic problem: despite sports' enormous social and

economic influence, their current business models inadvertently exacerbate environmental degradation. Participants emphasized the urgent need for cleaner energy solutions, better automobile fleets, and energy-efficient stadium infrastructure in order to mitigate this impact.

Theme 3: Lack of Environmental Management Practices

All participants expressed concern about Ghana's sports industry's glaring lack of effective environmental management. Waste management is one important area that has been overlooked. Participants pointed out that while large quantities of waste, including food packaging, plastic bottles, and other trash, are generated at sporting events from professional games to neighborhood contests they are rarely handled sustainably.

“During tournaments, there's a lot of waste, but it all goes into one bin. There's no separation of plastics or organics.” (NGO Advocate, Accra)

This irresponsible disposal not only pollutes the environment but also ruins opportunities for recycling and resource recovery. In urban areas where waste often clogs drainage systems, increasing the risk of flooding, participants emphasized how the lack of designated recycling bins, composting programs, or waste sorting stations at venues exacerbates pollution.

Theme 4: Limited Awareness and Prioritization of Sustainability

A growing awareness of climate change issues, especially among athletes and youth-focused organizations, was generally acknowledged by stakeholders in the sports and environmental sectors. Nevertheless, within the mainstream sports administration, this awareness has not yet resulted in institutional prioritization or tangible action plans.

A senior official from the National Sports Authority (NSA) candidly expressed the prevailing mindset:

“We are aware of the climate issue, but honestly, our main concern is logistics and funding. Sustainability comes much later, if at all.” (NSA Official)

Several participants agreed, explaining that operational issues like scheduling, facility upkeep, and funding take precedence over environmental considerations. There is little room to incorporate sustainability measures because the majority of

attention is still on short-term objectives like event planning and athlete performance.

Through advocacy campaigns and climate education initiatives, the Environmental Protection Agency (EPA) and a few non-governmental organizations have started to increase public awareness of the environmental impact of sports; however, these initiatives are still fragmented and lack adequate funding. There is an institutional lack of readiness and commitment in sports organizations, as evidenced by the lack of formal policies guiding climate action or dedicated sustainability officers.

Younger athletes and environmentalists in the field were more enthusiastic about green initiatives and frequently advocated for eco-friendly methods of event planning and training. However, these voices find it difficult to

Theme 5: Desire for Policy Direction and Capacity Building

Despite the evident challenges and gaps in sustainability integration, stakeholders demonstrated a strong sense of openness and readiness to adopt environmentally responsible practices as long as there are clear policy guidance and sufficient resources. Many participants emphasized that the absence of explicit directives or incentives from the government and sports authorities limits their ability to priorities green initiatives.

An event planner working with a regional sports council expressed this frustration and hope:

“If the Ministry gave a directive on green stadium practices or eco-friendly events, we’d comply. But right now, there’s no clear mandate.” (Event Planner, Sports Council)

The general need for formalized frameworks that incorporate sustainability into the sports industry's

operational policies is summed up in this statement. In the absence of national or sector-specific policies, respondents emphasized that efforts continue to be fragmented and sporadic, relying more on individual initiative than systemic change.

It was also emphasized that effective climate action requires capacity building. Many interviewees endorsed specialized workshops, technical training, and pilot projects aimed at providing valuable knowledge and skills to neighborhood associations, stadium managers, and sports administrators. Such programs would enable them to implement energy-efficient technologies, waste reduction strategies, and climate-resilient infrastructure adaptations.

Participants also suggested that these initiatives focus particularly on the local and regional levels, where resource scarcity is greatest and climate change impacts are most noticeable. on sports are deeply felt but often ignored.

This is consistent with broader calls in the literature for contextualized capacity development and policy enforcement in African sports contexts, as both top-down leadership and bottom-up empowerment are required for sustainable transformation (Simpson et al., 2018; Agyeman, 2019).

Theme 6: Youth-Led and NGO-Initiated Green Sports Projects

Despite the challenges and institutional gaps, the study discovered encouraging grassroots efforts to integrate environmental sustainability into Ghana's sports scene, primarily led by youth organizations and non-governmental organizations (NGOs). These initiatives serve as illustrations of innovative, bottom-up tactics that leverage the social influence of sports to promote climate

Research Question	Key Findings
Contribute to climate change?	The sports industry is becoming more and more susceptible to the consequences of climate change. Athletes' stress from the heat, especially in cities like Accra and Kumasi, waterlogged fields, and match schedule disruptions were all mentioned by participants.
How is climate change impacting sports in Ghana?	These results are consistent with worldwide patterns in which climate extremes pose a threat to athlete safety and outdoor sports infrastructure (Cunniffe et al., 2020; IPCC, 2022). Poor drainage systems and a lack of resilient infrastructure in Ghana make these issues worse.

In what ways does the sports industry contribute to climate change?	Though smaller in global emissions, Ghana's sports sector contributes to environmental degradation primarily through carbon-intensive domestic travel, use of diesel generators, and unsustainable waste practices during events. These findings mirror global concerns where the operational aspects of sports (transportation, energy use, infrastructure) are major contributors to environmental degradation (Collins et al., 2007; IOC, 2017). Lack of green building standards and energy-efficient practices further intensifies this impact.
What are stakeholder perceptions and readiness?	Institutional actors demonstrated low prioritization of sustainability due to constraints like funding, capacity, and lack of policy directives. However, there is a high degree of willingness to adapt if guided by clear policies, training, and financial support. This readiness echoes the findings of Agyeman (2019) and Boateng (2018), who noted a disconnect between environmental awareness and institutional capacity. The absence of formal environmental sustainability frameworks within sports governance structures remains a major barrier.
Are there existing innovations?	The study uncovered promising youth- and NGO-led initiatives, such as the Green Ghana Games, which incorporate climate education, tree-planting, and plastic bans. While still limited in scale and disconnected from formal sports governance, these projects signal growing civic engagement and offer scalable models for green sports development. Globally, similar grassroots innovations have emerged as important catalysts for mainstreaming sustainability in sports (UNEP, 2019; FIFA, 2020). However, in Ghana, these efforts require stronger policy linkages and public-private partnerships to achieve lasting impact.

Theme 6: awareness and action.

One notable example is the Green Ghana Games, an annual event in Accra that combines environmental stewardship activities like waste reduction campaigns and tree planting with competitive sports. Most importantly, by implementing sensible policies like banning single-use plastics during events, the organizers have emphasized waste reduction and ecological awareness. The strategic use of sports as a platform for climate education was explained by an NGO leader participating in the Games:

“We believe sports can be a tool for climate education. When fans see athletes planting trees, it sends a message.” (NGO Leader, Accra)

These programs promote community engagement with climate issues by leveraging the emotional and cultural resonance of sports. Despite their ongoing limitations in scope and reach, these initiatives demonstrate how sports can be used as a platform for environmental advocacy and behavioral change.

This is in line with similar trends observed in other African countries where youth movements and civil society are spearheading eco-sports initiatives despite a lack of funding (Kwarteng & Biney, 2021; Simpson et al., 2018). Globally, grassroots green sports programs are becoming more and more well-liked as an effective way to promote sustainability values locally (UNEP, 2019).

However, for these innovations to be effective and long-lasting, more institutional support, partnerships, and integration into formal sports governance structures are required. In Ghana's more expansive

Summary of Key Finding

What role does the research question play in climate change?

Important Results

What effects is climate change having on Ghanaian sports? The effects of climate change are increasingly affecting the sports sector. Participants mentioned

waterlogged fields, match schedule disruptions, and the stress that athletes experience from the heat, particularly in cities like Accra and Kumasi.

These findings are in line with global trends showing that climate extremes endanger outdoor sports infrastructure and athlete safety (Cunniffe et al., 2020; IPCC, 2022). These problems are exacerbated in Ghana by inadequate drainage systems and a dearth of robust infrastructure.

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How is climate change impacted by the sports industry? Ghana's sports industry contributes to environmental degradation mainly through carbon-intensive domestic travel, the use of diesel generators, and unsustainable waste practices during competition, despite having lower global emissions.

V. DISCUSSIONS, CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter critically analyses the study's findings by referencing earlier research, theoretical frameworks, and relevant national, continental, and international policy contexts. The study validates the dynamic and mutually reinforcing relationship between climate change and Ghana's sports industry. On the one hand, waste and energy consumption in transport and infrastructure are two ways that sports-related activities contribute to environmental deterioration. However, sports are becoming increasingly vulnerable due to the negative effects of climate change, including extreme heat, erratic rainfall, and strain on infrastructure.

1. This study uses an interpretivist paradigm and abductive reasoning to present complex perspectives from stakeholders who directly experience or influence the relationship between climate and sport.

These discoveries increase our understanding of how climate resilience and environmental sustainability are perceived, implemented, or the discussion consists of three primary points of contention that relate the empirical data to theoretical and policy implications:

2. How Climate Change Affects Infrastructure and Sports Participation in Ghana

3. Sports as a Potential Sustainability Agent and a Factor in Environmental Stress

4. Institutional Vulnerabilities, Policy Deficits, and Emerging Opportunities for Climate-Responsive Sports Governance

Each section puts the findings in a comparative framework and makes the case for localized policy innovation, multi-stakeholder engagement, and the integration of climate action into frameworks for sports development using examples from the Global North and the Global South, especially in Africa. The chapter ends with implications for theory, practice, and policy to promote both academic study and real-world reform.

Argument 1: Climate Change is No Longer a Distant Threat It is Actively Disrupting Sports in Ghana

The findings of this study disprove the notion that these effects will only become apparent in the future by demonstrating unequivocally how climate change is already affecting Ghana's sports performance, safety, and organization. Stakeholders from various sectors, including facility managers, athletes, planners, and environmental officers, were alerted to the growing number of rain-related match cancellations, training delays caused by extreme heat, and dangerous playing conditions, especially in major cities like Accra and Kumasi. These first-hand reports support previous research by Owusu and Waylen (2009), who found that rising temperature extremes and rainfall variability have an impact on public infrastructure and social systems throughout Ghana.

This local reality is not unique; rather, it is part of a global trend of climate change-related disruptions in sport. For instance, the Australian Open has frequently experienced delays and health issues due to extreme heatwaves and air pollution from bushfires (Cunniffe et al., 2020). In a similar vein, ski resorts in North America and Europe have faced shorter seasons and snow shortages, endangering the economies of winter sports and the cycles of athlete preparation (Scott et al., 2008; UNEP, 2019). These global patterns lend

credence to the idea that sport is especially climate-sensitive since it relies on stable environmental conditions and physical performance thresholds.

Nonetheless, a key differentiator is the capacity for context adaptation. More investments in weather insurance, resilient infrastructure, and early warning systems enable better adaptation, despite the fact that weather extremes are happening more frequently in the Global North. For instance, North American leagues like the NFL and MLB have updated their climate contingency protocols (Orr et al., 2022), and ski resorts in the Alps have installed artificial snow-making machines and changed their competitive calendars (Steiger & Abegg, 2013).

However, sports infrastructure in Ghana and much of Sub-Saharan Africa remains extremely vulnerable due to ongoing underfunding, poor maintenance, and a lack of climate-responsive planning. Amoako and Boamah (2015) claim that neither effective heat management practices nor drainage systems are present in any of Ghana's major stadiums. This reinforces the "adaptation gap" identified by the Intergovernmental Panel on Climate Change (IPCC, 2022), which highlights that lower-income countries are less prepared for and more susceptible to the effects of climate change, especially in non-traditional industries like sports.

Additionally, urban heat islands in cities like Accra and Kumasi make athletes more vulnerable, particularly when it comes to outdoor sports. Asare and Addo (2021) state that midday training sessions in environments lacking shade, cooling facilities, or medical preparedness frequently cause athletes to suffer from heat exhaustion and dehydration. These health risks are made worse by a lack of public health guidelines on exertion thresholds under extreme temperatures, an area in which countries such as Japan have already made progress (Yamamoto et al., 2020). The picture that emerges is one of systemic vulnerability, where climate change acts as a stressor that affects public health, infrastructure longevity, community involvement in sports, event scheduling, and athletic performance. This demonstrates how urgent it is to redefine climate adaptation as a necessity. According to Asare and Addo (2021), athletes commonly experience heat exhaustion and dehydration as a result of sports the urgent need to reframe climate adaptation as essential to Ghanaian sports development rather than as a side issue. It also

aligns with the call from African climate scholars (e.g., Kwarteng & Biney, 2021) for context-specific adaptation strategies that recognize the dual role of sport as both a victim and a potential vehicle for public climate education. In conclusion, sports in Ghana are already being affected by climate change in noticeable ways that are similar to those in the Global North but less protected. Therefore, it is not only urgent but also crucial for the long-term viability of sports and its developmental potential to close the adaptation gap through funding, legislative changes, and innovative infrastructure.

Argument 2: The Sports Industry in Ghana is a Silent Contributor to Environmental Degradation

This study demonstrates that the sports industry itself subtly but significantly contributes to Ghana's environmental degradation, despite the fact that climate change is commonly portrayed as an external threat to the sector. Numerous unsustainable practices that have proliferated throughout the national sports ecosystem were exposed by the focus groups and interviews. These include travel-related emissions, electricity produced using fossil fuels, and poor waste management at events. Ghana's sports industry is small compared to those around the world, but it has a concerning and largely unnoticed environmental impact. There is an urgent need to reframe climate adaptation as crucial to Ghanaian sports development because athletes frequently suffer from heat exhaustion and dehydration, according to Asare and Addo (2021).

A. Travel-Related Emissions and Infrastructure Inefficiencies

One major source of emissions, according to the participants, is domestic travel, especially by football clubs and regional teams. Older, diesel-powered buses are commonly used for interregional travel, but they produce a lot of carbon dioxide and other pollutants. Regular travel during football seasons is estimated by Mensah (2020) to contribute significantly to the nation's carbon output. This is in line with research from other African countries, where insufficient transport infrastructure frequently necessitates long road trips in inefficient conditions (AfDB, 2019). In contrast to wealthier nations where clubs are putting carbon offset programs or eco-friendly transport practices (like rail travel or electric buses) into place,

Ghana lacks coordinated plans to reduce the sector's travel emissions.

B. Reliance on Diesel Generators

Another minor but important factor causing environmental degradation is the frequent use of diesel generators in sports facilities. Participants said that while power outages are less frequent than in previous years, they still necessitate the use of fossil fuel generators, especially for broadcast events and evening games. In addition to carbon emissions, these generators also contribute to local air pollution and noise pollution. No major attempt has been made to convert stadiums or training facilities to more ecologically friendly power sources, despite Ghana's high potential for renewable energy, particularly solar (EPA, 2020). On the other hand, stadiums in countries like the Netherlands and Germany are increasingly using solar roofing and energy-efficient systems (UNEP, 2019).

C. Waste Mismanagement at Sporting Events

Additionally, the study discovered that environmental management practices are commonly overlooked during sporting events. Waste separation and recycling are practically nonexistent, and plastics, food packaging, and general waste are often disposed of together in ill-maintained bins. This result backs up Boateng's (2018) criticism of Accra Sports Stadium, which lacked even the most basic waste collection and sorting procedures. The environment suffers greatly from such negligence, especially considering how many single-use plastics are used at events. Additionally, the sports sector misses the opportunity to lead by example, undermining sustainability awareness initiatives. 2.4 Comparative Lessons from Global Best Practices

D. Implications and Opportunities for Change

The need for Ghana's sports industry to shift from passive awareness to proactive engagement is highlighted by this "silent contribution" to environmental degradation. Despite their willingness to embrace greener practices, stakeholders pointed to a lack of funding, technical know-how, and policy mandates. The Ghana Football Association, the Environmental Protection Agency, and the Ministry of Youth and Sports have a vital chance to work together on national guidelines for sustainable sports

operations. The implementation of sustainability standards, capacity-building workshops, and stadium green retrofitting could all act as catalysts.

In conclusion, the Ghanaian sports sector contributes to climate change rather than being a victim of it. It runs the risk of undermining more general national and international climate goals if deliberate reform is not implemented. Acknowledging and resolving the environmental footprint is a necessary step toward a more resilient and responsible sports ecosystem.

Argument 3: The Willingness to Change Exists but the Policy and Institutional Framework is Missing

The glaring discrepancy between stakeholders' desire to adopt sustainable practices and the absence of institutional frameworks to facilitate such engagement is among the study's most startling findings. Participants, who ranged from facility managers to athletes and leaders of non-governmental organizations, stated that they wanted to "do more," but they cited a lack of policy guidance, organized funding, and technical capacity as the main obstacles. This illustrates a larger structural issue with Ghana's climate governance: there is passion, but there are no supporting structures.

A. Acknowledged Interest, But Competing Priorities

According to the findings, Ghanaian sports administrators do not oppose sustainability, as stated by Agyeman (2019). Rather, they operate in a resource-constrained environment where urgent concerns such as infrastructure maintenance, player welfare, and match logistics usually take precedence. Instead of denial, reprioritization causes a sort of sustainability inertia. A prevalent trend in many low- and middle-income countries is the underfunding of sports organizations and their exclusion from national climate adaptation planning.

B. Absence of Policy Integration

Despite the fact that sports are crucial for climate adaptation, the Ghana National Climate Change Policy (MESTI, 2013) says nothing about the sports sector. This omission reflects a siloed approach to governance, where environmental policy and sports are seen as separate fields. The ramifications are profound: sports organizations lack the authority and motivation to incorporate sustainability into their operations in the absence of national recognition. The

same issue has been noted in countries such as Kenya and Nigeria, where climate policy seldom addresses cultural sectors like sport, music, and tourism (UNDP, 2021).

Numerous donor-funded green features, such as water harvesting and renewable energy systems, that were put in place for the 2010 FIFA World Cup have since lapsed because local ownership and maintenance have been lacking, even in South Africa, which is frequently cited as a continental leader in sports infrastructure (Simpson et al., 2018). This emphasizes a crucial lesson for Ghana: for sustainability initiatives to last beyond specific events or projects, they must be integrated into local governance and planning frameworks.

C. Bottom-Up Innovations Need Top-Down Support

These innovations struggle to gain traction. Civil society actors who are required to continuously self-fund and self-organize without institutional support run the risk of experiencing burnout. Thus, a strong, multi-level governance strategy is necessary, where ministries, local authorities, and civil society co-create sustainability pathways for sport.

What Institutional Reform Might Look Like

According to Saunders et al. (2019), these suggestions align with systems thinking methodologies that prioritize both institutional coordination and grassroots action. If given the required institutional scaffolding, Ghana's sports industry has the social capital, youth involvement, and cultural influence to take the lead in climate action.

VI. CONCLUSION

This study sought to explore the interdependent relationship between Ghana's sports industry and climate change through a qualitative analysis of stakeholder experiences, institutional practices, and policy contexts. The results show that climate change is no longer a distant environmental problem but rather an ongoing and expanding issue that is already affecting sports because of extreme heat, erratic rainfall, flooding, and poor infrastructure.

Despite being under-represented in national climate discussions, the sports industry also reveals itself as a silent contributor to environmental degradation. Practices such as the use of diesel generators, poor waste management, and carbon-intensive regional

travel reveal a pattern of unsustainable operations embedded in sports management and culture.

One significant paradox that the study brought to light is that the sports industry in Ghana is both a casualty of climate change and an enabler of its progression. This dichotomy emphasizes how urgently focused intervention is needed. Although stakeholders show a desire to embrace sustainable practices, institutional guidance, policy integration, and technical capacity are lacking, which impedes this goal.

If coordinated action is not taken that includes policy reform, innovative infrastructure, and environmental education, the sports industry faces the risk of further deteriorating as a physical venue for recreation as well as a social tool for youth development, patriotism, and community cohesion. Therefore, strategic reforms are not only appropriate but also necessary for Ghanaian sports to continue to be resilient and sustainable.

VII. IMPLICATIONS

A. Theoretical Implications

This study contributes to the increasing amount of research, particularly in the Global South, on the connection between sport and climate change. By using an abductive, qualitative approach, it highlights the understudied reciprocal nature of this relationship, where sport is both a victim and a vector of climate impacts. It also builds on the existing literature by integrating stakeholder narratives into broader theoretical discussions about infrastructure vulnerability, institutional inertia, and environmental justice in low-income settings.

Furthermore, the study supports assertions from systems theory that for transformation to be sustainable, changes must be made at several nodes, including policy, infrastructure, culture, and behavior (Saunders et al., 2019). It highlights the significance of interdisciplinary sports studies that span social theory, public policy, and environmental science.

B. Policy Implications

The findings point to significant weaknesses in Ghana's frameworks for climate governance and sports policy. Sport's exclusion from national climate policy documents, such as the Ghana National Climate Change Policy (MESTI, 2013), is a grave oversight given its broad appeal and environmental impact.

The Ministry of Youth and Sports, the Environmental Protection Agency (EPA), and the Ministry of Environment, Science, Technology, and Innovation (MESTI) urgently need to work together across ministries. These organizations must work together to develop integrated strategies that link green infrastructure, sustainable event management, and climate education within the sports ecosystem. Without this, stakeholder willingness and community-level initiatives will remain isolated and unsustainable.

C. Practical Implications

For practitioners like coaches, athletes, facility managers, and sports administrators, the study is a wake-up call. Climate change adaptation is now required. Athlete health issues, schedule delays, and infrastructure damage all indicate growing operational challenges. Sustainability must be viewed as a need rather than an extra if sports organizations are to survive over the long term.

Examples of practical actions include participating in capacity-building programs, co-hosting green events with NGOs and environmental groups, and implementing low-cost green practices (e.g., waste segregation, solar lighting, and efficient travel planning). Venues that adopt environmental best practices may also see an increase in their competitiveness and reputation as sponsors and supporters place a higher value on sustainability.

D. Future Research Directions

Numerous research avenues are made possible by this study. Quantitative studies could measure the carbon footprint of sports activities in Ghana, while comparative research could look at green transitions in the sports industries of other African countries. Longitudinal studies can also track how climate-smart interventions affect institutional behavior over the long run.

Last but not least, participatory action research holds promise for co-designing and testing community-led green sports initiatives, particularly in disadvantaged areas. Such work would expand understanding and have a greater impact outside of academic and urban circles.

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