

A Work Project, presented as part of the requirements for the Award of a Master's degree from
the Nova School of Business and Economics.

HOW CLIMATE CHANGE AND ENVIRONMENTAL DISASTERS AFFECT
GRASSROOTS FOOTBALL CLUBS, AND IMPACTS THE COMMUNITIES
IN EUROPE?

THE RESILIENT ADAPTATION TO CLIMATE CHANGE: ASSESSING THE
FEASIBILITY FOR GRASSROOTS FOOTBALL CLUBS

JONAS RATHE (60471)

Work project carried out under the supervision of:

Inês Caetano

15/12/2024

Abstract

This thesis examines the impact of climate change on grassroots football clubs in Europe, focusing on France, Germany and Italy. Grassroots football, which is vital for community identity and cohesion, faces challenges from rising temperatures, flooding and financial pressures. These disruptions affect infrastructure, participation and sustainability, with wider implications for mental health and social ties. Case studies highlight adaptation measures and their effectiveness in building resilience. The research calls for stronger policies, innovative solutions and stakeholder collaboration to mitigate climate risks and preserve the social and economic benefits of grassroots football.

Keywords: Grassroots Football, Climate Change, Environmental disasters, Adaptation, Impact, Feasibility

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209)

1. Introduction (JIM BAUER)

1.1 Common Goal

For our thesis, we are collaborating with Common Goal, a charitable movement founded in 2017 by streetfootballworld, aiming to create a more sustainable and equitable future through football. By encouraging players, coaches, and clubs to pledge at least 1% of their salaries or revenues to social projects, Common Goal seeks to leverage football's influence to address global challenges like inequality, education, and climate action. Their efforts emphasize the connection between football and broader social causes, highlighting the need to investigate how climate change impacts grassroots football. Through partnerships with organizations, athletes, clubs, and brands like Adidas and FIFA Foundation, Common Goal drives progress toward the United Nations Sustainable Development Goals. Our research, in collaboration with Common Goal's resources and our own findings, aims to explore how environmental challenges are affecting grassroots football and why responding to these impacts is crucial.

1.2. Grassroots Football

It is essential that we clarify the primary topic of discussion: grassroots football. According to the *UEFA*, grassroots football is defined as the amateur level of the sport, played by everyone irrespective of age, ability, ethnicity, nationality, religion, sex, sexual orientation, or any other personal characteristic. It forms the foundation of the game, prioritizing the love of football and the joy of participation over professional achievements. Beyond being a sport, grassroots football helps instill positive values, promotes healthier lifestyles, and unites communities (UEFA 2024). The informal and community-driven nature of grassroots football also fosters a relaxed environment where participants are encouraged to learn, grow, and build relationships through the shared experience of playing football. Another defining feature of grassroots football is its adaptability. Whether played in parks, schoolyards, or improvised fields, grassroots football does not require formal pitches or expensive equipment. This accessibility

lowers barriers to entry, making it easier for people across different social and economic backgrounds to get involved. By focusing on inclusivity, enjoyment, and accessibility, grassroots football not only nurtures a love for the sport but also encourages regular physical activity and social interaction.

While grassroots football encompasses the inclusive and accessible spirit of sport, grassroots football clubs bring this vision to life within communities. These clubs are more than just places for people to play; they are local institutions that foster connections, provide support, and serve as cornerstones of community life. In the next section, we will dive deeper into the vital role these clubs play within their communities.

1.3. The Role of Grassroots Football Clubs in Communities

Grassroots football clubs serve as vehicles for education, personal development, and mental health, having a profoundly positive impact on society. These clubs provide more than just athletic training; they are spaces where people learn life skills, build resilience, and experience the benefits of being part of a supportive social network. Through organized activities and values, they promote grassroots clubs, create environments that foster emotional well-being, teach discipline, and encourage teamwork.

In addition to nurturing physical health, grassroots football clubs play a crucial role in supporting mental health. Research has shown that regular involvement in community sports can reduce stress, enhance mood, and combat loneliness, as it offers participants a sense of belonging and purpose. According to *Playing Against the Clock*, grassroots sports, including football, are particularly valuable in areas facing economic hardship or social challenges, as they provide accessible avenues for social interaction and mental health support. By offering a safe and structured setting, these clubs contribute to building resilience, helping individuals

cope with the pressures of modern life. We will tackle the subject of social implications for the communities in more detail later in our thesis.

Education is another cornerstone of grassroots football clubs. Many clubs implement programs that emphasize life skills, such as leadership, conflict resolution, and perseverance. This commitment to education aligns with UEFA's values, as grassroots football clubs often serve as informal "classrooms" where individuals can develop social and communication skills that extend beyond the field. Environmental stewardship has also emerged as a priority for some grassroots football clubs, inspired by the increasing awareness of climate change's impact on local communities and the world of sport. As *Playing Against the Clock* outlines, climate change poses significant threats to sports infrastructure and accessibility, particularly for grassroots fields vulnerable to extreme weather. In response, several grassroots clubs have adopted sustainable practices, such as using renewable energy or organizing eco-friendly events, thereby educating their members about environmental responsibility and reinforcing the role of football as a force for positive change. Both these aspects will be discussed further in detail later in our thesis, through case studies, with two associations, working closely with *Common Goal*.

Now, we will give a brief overview of the problems grassroots football clubs face when it comes to climate change and environmental disasters, a key aspect of our thesis, and something we aim to offer solutions to.

1.4 Briefly Introduce the Global Economic Context of Climate Change (ZICHEN WANG)

Climate change has emerged as a key challenge for the global economy, with far-reaching implications for several industries that depend on the natural environment, particularly agriculture, tourism and sports. The financial stability of these industries is increasingly under pressure due to the frequency of extreme weather events and changing climate patterns. For example, Swiss Re warns that the global economy could lose up to 18% of its GDP by 2050 if

global temperatures rise by 3.2°C, and in the worst-case scenario, this figure could be even higher. This worrying projection is based on the current trajectory of temperature rise and the failure to fulfil the Paris Agreement. Failure to address climate change could result in economic losses of \$1.7 trillion per year by 2050. It also highlights that grassroots football clubs will be disproportionately affected by climate change due to resource and financial constraints, making the need to explore the economic impact of climate change on the sector increasingly important.

1.5 Briefly Introduce the Economic About Grassroots Football

Grassroots football plays a vital role in local communities, with grassroots football clubs not only providing a platform for physical activity for the residents of that community but also being a key driver in supporting small-scale local economies and creating jobs. According to UEFA research, grassroots football in Ireland contributes €1.8bn to the economy each year. Of this, €355 million is contributed directly through player spending, investment in facilities and volunteer work, with a further €1.14 billion saved in healthcare costs due to improved health and reduced chronic disease. Similarly, in England, grassroots football delivers over £10bn of benefits to society each year, largely in the form of public health contributions through the reduction of mental health problems. These findings highlight the importance of grassroots football in sustaining community wellbeing and reducing the healthcare burden.

Economically, grassroots football is a major driver of the local economy, particularly in more economically disadvantaged areas. These clubs are heavily reliant on community engagement and financial support from local resources such as match day revenue, sponsorship from small businesses and financial grants from local government. Although their operating funds are much smaller than those of professional clubs, their economic impact is still significant. Like professional football clubs, match days are one of the key sources of income for grassroots football clubs too, supporting local suppliers and event organizers through ticket sales, associated merchandise and food and drink sales.

In addition, grassroots football brings indirect benefits to the local economy through increased social cohesion, such as increased local business expenditure and community networks that attract further investment. However, it cannot be ignored that grassroots football still faces financial vulnerability, particularly in terms of maintaining basic facilities and operations, which emphasizes the need for continued community economic support..

1.6 Introduction & Context of Grassroots Football in Italy (FEDERICO MARTINETTO)

Grassroots football represents the foundation of the sport, prioritizing participation, inclusivity, and social impact over professional competition. In Italy, this domain is primarily overseen by the Settore Giovanile e Scolastico (Youth and School Sector) of the Italian Football Federation (FIGC), which manages activities for children aged 5 to 12 under categories like Piccoli Amici (Little Friends), Primi Calci (First Kicks), Pulcini (Chicks), and Esordienti (Debutants) (FIGC n.d.). These categories combine promotional, educational, and recreational aspects of football, enabling children to play while also developing their skills. Complementing these activities are structured yet inclusive formats, such as the Under-12 Female Tournament, Under-13 Fair Play Elite, and Under-15 Championships, which allow children to participate in organized competition (UEFA 2019). Special initiatives like Calcio+15 Femminile and UEFA Playmakers further promote football among girls, and the annual “Grassroots Festival” at the Coverciano Technical Center celebrates the achievements of grassroots participants (FIFA Training Centre n.d.).

Beyond the scope of competition and recreation, grassroots football in Italy also functions as a transformative platform for education and community development. For example, the program Tutti in Goal, a collaboration between FIGC and the Ministry of Education (MIUR), goes beyond football by teaching children organizational, communication, and leadership skills. Participants aged 10 to 13 are encouraged to engage in tournament logistics, promotion, and refereeing, promoting holistic development that extends beyond the football pitch (Diamond

Football n.d.). These elements illustrate how grassroots football contributes to the personal and social growth of young individuals while fostering inclusive communities.

1.6.1 Relevance of the Topic

Grassroots football is especially significant in Italy, where challenges such as economic inequality, social exclusion, and the need for community cohesion persist. As the country's most popular sport, football has the power to bring people together and address these societal issues. Programs like Tutti in Goal, which aim to tackle problems like school dropout and bullying, demonstrate the potential of grassroots football to foster inclusion and equip young people with essential life skills (FIFA Training Centre n.d). Similarly, initiatives spearheaded by organizations like Play for Change use football to transform vulnerable communities. Through projects such as Liberi Nantes and Lay's Replay, Play for Change creates safe, inclusive spaces where young people can thrive, thereby reducing marginalization and fostering sustainability in disadvantaged areas (Play for Change 2023). These examples highlight how grassroots football not only addresses immediate challenges but also serves as a catalyst for long-term social transformation.

2. Climate Overview and external climate effects on grassroot football clubs

2.1 General and Global Climate Overview (JONAS RATHE)

The average weather over a defined period is referred to as climate, reflecting the changes within that period. It results from the composition and interactions between natural elements such as air, oceans, plants, animals, ice, snow, and rocks. These elements are constantly interacting, thus influencing the temperatures on our planet. However, these temperatures are currently changing dramatically as the Earth absorbs increasing amounts of heat energy from the sun. This is just one phenomenon in the interconnected climate system that leads to the warming of the atmosphere and represents a pressing problem (Regato, Burgard, and Jones 2022, 1). The scale of the issue is still moderate at present, although the consequences of climate

change are already being felt. However, when considering climate change over a long-term horizon, scenarios emerge that could pose a threat to human life, especially when engaging in sports in certain regions of the planet (Schneider and Mücke 2024, 12-20). One of the main reasons for this change is the increased concentration of greenhouse gases, which are primarily caused by human activities. The greenhouse effect itself is described by the release of short-wave solar radiation into the Earth's atmosphere, which is transferred to the ground and oceans. At the same time, long-wave solar radiation is reflected back to the sun from the Earth's surface, resulting in a constant temperature equilibrium. To ensure that the temperature within the atmosphere is maintained and not directly reflected, greenhouse gases such as water vapor (H_2O) and carbon dioxide (CO_2) help maintain a constant temperature (NASA 2024). However, since industrialization, human activities have caused a continuous increase in the concentration of these gases, which in turn strengthens the natural greenhouse effect and causes the average temperature of the Earth's surface to rise continuously. A comparison with the pre-industrial era shows that carbon dioxide concentrations were approximately 40 percent lower (IPCC 2013). In addition to greenhouse gas emissions, the problem of climate change is also influenced by short-lived climate pollutants (SLCPs). These air pollutants, which remain in the atmosphere for a short period (from a few days to a maximum of four weeks), also contribute to the warming of the Earth's surface. These include aerosol particles like fine dust and soot, as well as harmful gases such as ozone (NASA 2024). The harmful aerosols, in particular, lead to the absorption of sunlight, allowing UV rays to reach the Earth's surface more directly, contributing to the warming of the atmosphere. Additionally, the increased emission of aerosols leads to more cloud formation, which results in more precipitation. In addition to describing the problem of climate change, it is important to describe the characteristics of the climate system. Particularly noteworthy is the system's inertia, meaning the delayed response time. The problems caused by greenhouse gas emissions and harmful aerosols today are the result of actions taken in previous decades. The consequences of today's actions, however, will only be felt in the coming years

(European Commission 2024). Further temperature increases are therefore expected. An example of this is the Arctic region, where the average temperature has risen continuously since 1940 (NOAA 2023). Climate actions are expected to have an aftereffect of 40 to 50 years (Pacific Northwest National Laboratory 2024). Experts from the Intergovernmental Panel on Climate Change (IPCC) predict that the average temperature in the 21st century will not rise by just 0.7 degrees Celsius, but the increase will be significantly more drastic (IPCC 2014). This is confirmed by the IPCC, which has analyzed climate change in the coming years using various models. Despite uncertainties about the future, the models produce relatively clear development scenarios.

Example Munich RE

The development of temperatures is the result of an exponential emissions committee, which is largely of human nature. Using the example of the reinsurer Munich RE, the consequences of climate change will be shown. In particular, the impact of increasing natural catastrophes on a hydrological and metrological level will be shown.

This development will have numerous consequences for humans. For example, the increased average climate will result in many ice melts and snowfall, which will cause sea levels to rise (IPCC 2013). Other consequences of climate change are also evident, such as warmer, drier summers and milder winters. In the short term, extreme weather events such as storms, heat waves, heavy rainfall, and flooding will increase in frequency and intensity. In addition, unpredictable weather phenomena are having an increasingly direct impact on people, resulting in temperature fluctuations, water shortages, and droughts. Water use is equally affected, as it may contain more and more legionella bacteria due to warming temperatures. Apart from the physical vulnerability of humans, living space will also be affected, especially areas that are connected to the water must expect flooding and increasing storm surges (Knieling and Müller 2015, 9). According to the Intergovernmental Panel on Climate Change, a rise in sea level of just 0.5 meters will triple the amount of living space in flood-risk areas (IPCC 2014).

2.2 Impact of Changing Weather Conditions

This section will take a closer look at climate change and its effects. The climate change described has an impact on people's entire everyday lives, but these developments are particularly relevant because the climate can have a strong relevance for sporting activities. There is almost no sport that is not integrated into an ecosystem. Sports clubs actively influence natural conditions and climatic factors (NC State University 2020). Sports such as soccer are organized on large open spaces, whether in the city or a village region, so they encounter continuous interactions between sporting activities and natural ecosystems (Hognestad et al. 2022, 1). Concerning increasing temperatures, weather extremes, and the shift in seasonal weather patterns, sports clubs, especially soccer clubs, are increasingly affected by the consequences. Changing conditions in summer are manifested in ever longer periods of heat and drought, with increasing soil erosion and the need to irrigate the ground more frequently and for longer periods. In contrast, the winter months are becoming milder and wetter and playing activities can come to a standstill much more quickly if the playing surfaces are unsuitable. Due to the increased number of rainy days and extreme weather events with heavy rainfall, pitches are flooded or soaked with water. Playgrounds and sports activities, including usage times, can be significantly impaired as a result.

2.2.1 Direct heat effects of climate change on soccer

The direct effects of climate change are becoming increasingly evident, and sports, including soccer, are not exempt. One striking example is the postponement of the 2022 FIFA World Cup to the winter season. Due to extreme summer temperatures in Qatar—often reaching 40 degrees Celsius—the tournament was rescheduled for December to prioritize athletes' health (The Business Standard 2022). This decision reflects the broader trend of rising summer temperatures worldwide. In Europe, the Intergovernmental Panel on Climate Change (IPCC) has documented a significant increase in summer temperatures over recent decades (IPCC 2021). Taking Germany as a reference, the country has recorded numerous temperature records

in recent years. In 2019 alone, the German Weather Service recorded a maximum temperature exceeding 40 degrees Celsius on 16 occasions within a single summer (Statista 2019). The trend continued in 2024, with an average summer temperature of 18.5 degrees Celsius—2.2 degrees above the internationally recognized reference period. The rise in heatwaves and extreme temperatures presents new challenges for outdoor sports, particularly soccer. These conditions increase physical strain on players, affect venue usability, and compromise infrastructure durability. The health risks associated with high temperatures are particularly concerning. Studies by the World Health Organization (WHO) indicate that playing for 90 minutes in temperatures above 30 degrees Celsius significantly increases the risk of heat-related illnesses. Common health risks include dehydration, heatstroke, and circulatory problems (Goldblatt 2020). Dehydration, in particular, poses severe risks for players. The loss of fluids and electrolytes can lead to dizziness, fatigue, muscle cramps, and in extreme cases, heatstroke. Prolonged dehydration reduces blood volume, thickens the blood, and increases heart rate, making it difficult for vital organs to receive adequate oxygen. Younger and older players are especially vulnerable, as their thermoregulation is less efficient under extreme conditions (Cramer 2021). Additionally, dehydration contributes to a higher risk of musculoskeletal injuries. Reduced muscle endurance due to fluid loss increases the likelihood of sprains and strains. Research referenced in the National Athletic Trainers' Association Bulletin confirms that dehydration levels of just 3-4% can significantly impair muscle function and raise the risk of injuries. These findings highlight the urgent need for adaptation strategies in amateur and professional soccer, ensuring player safety and sustainable game operations in the face of climate change.

3. The Resilient Adaption to Climate Change: Assessing the feasibility for grassroots football clubs (JONAS RATHE) (INDIVIDUAL PART)

.3.1 Football Clubs in Germany

This subchapter is primarily concerned with German amateur football clubs. This sport is defined by the fact that it represents non-professional community-orientated football. The focus is on participative and integrative approaches rather than competitive structures or performance-orientation. Children, young people, adults, and people with physical disabilities play in this area of sport, as the aim is to provide access to sport for all (UEFA 2024).

Meanwhile, 24,000 amateur football clubs in Germany belong to the popular sport, which are organized by the German Football Association (DFB). With around 7.4 million members, the DFB is the world's largest sports association for amateur footballers. The organization is based on a pyramid organizational model. At the top are the DFB and the five different regional associations (North, West, South, South-West, and North-East), subdivided into 21 different regional associations. The last cascade, i.e., the regional associations, is responsible for the organization and operation of amateur football (European Football for Development Network 2024). Therefore, the organization represents almost ten percent of the German population and is not only the most popular and largest amateur sport in Germany but also has a particularly strong social anchorage. As a popular sport, the amateur sport of football has a significant obligation and importance. It is one of the key factors for the successful integration of individuals into a diverse society characterized by a multitude of different cultures, as is the case in the Federal Republic of Germany. Amateur football promotes sporting activity for many people and strengthens the prevention and rehabilitation of illnesses. Thus, organizations ensure active togetherness by playing sports (International Olympic Committee 2022). In addition, sports clubs also contribute to life support and socialization. Numerous programs strengthen the integration of people from all social classes. In addition to the typical organizational form of the sports club, various social initiatives and projects have emerged that serve the common

good. In 2016, for example, 29 percent of clubs were involved in helping refugees, 35 percent promoted inclusion for the disabled, and 52 percent were committed to preventing sexual violence in clubs (Federal Institute for Sports Science 2016).

3.2 Climate protection and climate adaptation

3.2.1 Climate protection

Climate protection refers to avoiding and reducing greenhouse gas emissions such as carbon dioxide and other long-lived greenhouse gases, which can contribute to reducing temperature increases (IPCC 2014). To ensure that irreversible climate damage can still be contained, measures must focus on reducing emissions. This involves switching to renewable energies, improving energy efficiency, and expanding natural carbon sinks (Stern 2006).

Amateur football clubs can play a central role in climate protection. Sports organizations are seen as multipliers for climate-friendly practices and can ensure a great deal of climate protection in their communities. The theory of environmental responsibility in sport by Kellison and McCullough in the *Journal of Sport Management* from 2018 confirms this statement. It is increasingly assumed that sports organizations should assume economic, social, and environmental responsibility. Due to its prominent role in society, explained in the previous section, amateur sport has great potential to influence broad sections of the population (Trendafilova, McCullough and Pfahl 2014). The theory of environmental responsibility argues that sports organizations should take measures to reduce these impacts. According to Kellison and McCullough, there is a moral imperative to act environmentally friendly and sustainably, which is why amateur sports should have a high profile in environmental protection. Amateur sports clubs must focus on the core climate protection issues to fulfill their responsibility. The topic of reducing emissions should be prioritized. As amateur clubs often have considerable energy requirements due to their infrastructure - from club buildings to floodlights - there is potential for reducing emissions through efficiency measures. For example, clubs could reduce

CO₂ emissions by switching to LED lighting or installing energy-efficient heating systems. Based on the findings of the European Commission, switching to LED lighting can reduce electricity consumption by up to 70%. (European Commission 2024).

Another key objective of climate protection is using renewable energies and efficient technologies in energy-intensive areas (European Commission 2024). Sports clubs can simultaneously set an example and increase their energy independence by using photovoltaic systems on club buildings or integrating sustainable heating systems such as heat pumps. Through such measures, the clubs reduce their operating costs and actively contribute to climate protection (Stern 2006). The US Department of Energy emphasizes that although specific renewable energies, particularly photovoltaic systems, are an expensive initial investment at USD 30,000, they are typically fully amortized after five to eight years (U.S Department of Energy 2024).

Clubs also must inspire their members to protect the climate. According to Kellison and McCullough, there is a moral necessity for environmental responsibility, which should also extend to the actions of club members. Therefore, the club can promote the impetus for implementing climate protection, for example, by making offers for environmentally friendly travel. Sports organizations can create incentives to reduce emissions with concepts such as "Cycle to sport" or "Sharing mobility in the form of carpools." Climate Alliance Germany, a registered association, has been promoting the "Stadtraddeln" project since 2008. As part of this cooperation, German cities and local associations encourage members and citizens of the city to switch to cycling on 21 consecutive days between May and September (Klimabündnis 2018). The study by Climate Alliance Germany found that in 2023, 2,900 cities and clubs with 1.1 million participants were able to save around 40,000 tonnes of carbon dioxide by cycling 220 million kilometers (Klimabündnis 2024).

A significant climate protection can only be achieved if institutional support is provided through subsidies or funds. In amateur sports, clubs must have access to funding programs. Specific

funding programs ensure smaller clubs can also receive funding for climate-friendly measures without burdening their financial resources. This enables broader participation and ensures that climate protection measures can penetrate all levels of society.

The European Union and the Federal Republic of Germany, mainly, are paving the way for climate protection initiatives with their corresponding climate funds and legislation. For example, the European Union launched a new social climate fund in 2024, making around 65 billion euros available in 2026. The fund aims to support socially disadvantaged groups and sectors. Associations, in particular, will then be able to receive funding for energy efficiency projects, environmentally friendly heating systems, or building refurbishment. The EU's social climate fund prefers that two percent of the funding alone is only available to European sports organizations. The Federal Republic of Germany has also developed numerous energy concepts within the federal government since 2015. These included the Climate Action Programme, the National Energy Efficiency Action Plan, and the Climate Action Plan for 2050.

3.2.2 Climate adaptation

In addition to mitigation efforts, climate adaptation is gaining significance as it focuses on managing climate impacts after they occur. Adaptation aims to enhance the resilience of social, ecological, and economic systems by reducing vulnerability and fostering self-regulation (United Kingdom Climate Impacts Programme 2005).

Sports clubs must transition toward implementing adaptation strategies to cope with advancing climate challenges. According to Wicker, Hallmann, and Breuer, resilience theory in sports organizations follows a three-step system: (1) absorbing climate stress without major disruptions, (2) reorganizing structures for better self-regulation, and (3) implementing strategic transformations for long-term climate resilience. A real-world example is the Whalley Range Cricket & Lawn Tennis Club in Manchester, England, which adopted a resilience strategy to combat recurring droughts and floods. The club implemented natural reforestation for water retention, reduced chemical lawn care, and partnered with the City of Manchester and the

Woodland Trust to develop an ecological infrastructure and a long-term climate protection plan (Sport England 2024).

Further advancing resilience research, Clarke and Mason (2024) introduced the Climate Vulnerability to Sports Organisations Framework (CVSO), which systematically assesses climate risks using indicators like the Bulb Globe Temperature Index (WBGT). The Adelaide Oval Stadium Trust in Australia applied this framework to evaluate vulnerabilities and implemented rainwater harvesting and solar-powered cooling systems to mitigate heatwaves and water scarcity (National Weather Service 2024). Institutional support is essential for effective adaptation. Unlike climate protection funding, adaptation funding often falls under regional and municipal governance due to varying geographical conditions (IPCC 2014). However, international collaboration is needed to align regional and global strategies.

Germany took early political action with the 2008 German Adaptation Strategy (DAS), providing a flexible framework for adaptation measures. In 2023, the Climate Adaptation Act (KAnG) and the "Climate-adapted Forest Management" program were introduced to enhance municipal resilience and support over 9,000 renaturation projects (Federal Ministry for the Environment 2023). Other European nations have also developed adaptation plans. The Netherlands' "Delta Programme" integrates structural and ecological measures for flood prevention (Ministry of Infrastructure and Water Management Netherlands 2024), while France's "Plan National d'Adaptation au Changement Climatique (PNACC)" prioritizes health, agriculture, and coastal protection. France also involves communities and sports clubs in co-designing adaptation strategies. Despite these efforts, stakeholders, including the OECD and IPCC, criticize existing adaptation measures for being overly generalized. They argue that many initiatives lack practical feasibility at the local level due to insufficient cooperation between regional and multinational adaptation efforts. Additionally, political bureaucracy and unmet commitments in national adaptation initiatives hinder effective implementation.

3.2.3 Obstacles to climate adaptation

The criticism about climate adaptation indicates that there are considerable challenges in terms of implementation and effectiveness. Smaller sports clubs, in particular, are confronted with the consequences of this. Major obstacles result from a lack of financial and human resources. Many organizations, especially sports clubs, rely on voluntary work and have limited resources to invest in adaptive and resilient infrastructures. This becomes clear when you realize that 85% of German amateur sports clubs rely on volunteers. At the same time, however, the number of volunteers fell by half a million between 2014 and 2019. (Simonson et al. 2019, 14). In addition, there is often a lack of clear funding structures and advisory support, so initiatives often fail at the application stage (Wicker, Hallmann and Breuer 2013).

In addition, the temporal discrepancy between the costs and benefits of climate adaptation measures is a recurring problem. While the investments are made now, the benefits often only become apparent in the long term. For example, artificial turf pitches at football clubs can only be amortized after five to ten years. The decisive factors here are the low single-digit million range acquisition costs and the additional maintenance such a pitch requires (University of Illinois Urbana Champaign 2024). This so-called discounting problem leads to measures being postponed. Adaptation strategies' associated complexity and uncertainty further exacerbate this tendency, as decision-makers tend to postpone difficult decisions (Stern 2006). Putting the three-step theory from the climate adaptation part into context, the discounting problem leads to not going beyond the first phase of increasing resilience. Minor changes are made, such as renewing pitches after rainfall or renovating cabins after flooding. However, sustainable adaptive measures are not usually considered, as long-term planning with explicitly high sums would not correspond to the cost recovery approach of many clubs.

However, the most decisive obstacle is that society's perception of climate adaptation remains low. While climate change and measures to minimize emissions are receiving increasing attention, the importance of adaptation strategies remains largely untapped. There is a lack of

targeted communication strategies within sports clubs to gain acceptance and support for climate adaptation (United Kingdom Climate Impacts Programme 2005). The lack of complex knowledge transfer from research exacerbates this problem. The 2021 Sustainability Report of the German Olympic Sports Confederation (DOSB) shows that 70 percent of sports club management boards lack concrete information on climate adaptation measures (Price Waterhouse Cooper 2021). For this reason, successful adaptation can only be achieved if the assessment of regional data is analyzed using specific frameworks such as the CVSO and then placed in the context of an adaptive transformation strategy, according to Wicker, Hallmann, and Breuer. The decisive factor for adaptation is the transfer of scientific findings into practical solutions, which is often unsuccessful. From a current perspective, there is, therefore, a gap between research and application (IPCC 2014).

3.3 Interview methodology

3.3.1 Sample and selection of interviewees

The sample consists of representatives and members of amateur football clubs and institutions, including club managers, coaches, players, a representative of a regional sports association, and a person from the Lower Saxony sports committee. This explicit selection of people was made because the differentiated groups could emphasize different perspectives on the challenges and adaptation options in their way. The diversity of the results highlighted shows that the sustainability manager at TSV Havelse is leading a comprehensive project in which he is responsible for a complete sustainability strategy with an implementation plan. While smaller clubs, such as TSV Bemerode, prioritize responsibility and adaptation to climate change to avoid losing sight of their day-to-day business. The financial situation and the sponsor network repeatedly determine the prioritization of climate-relevant topics. The diversity of the interviewees and their answers should, therefore, make it possible to carry out a comprehensive feasibility analysis and examine the adaptability of amateur football clubs.

3.3.2 Conducting the interviews

The interviews that were collected are part of this thesis's qualitative research method and were conducted in a semi-structured manner. This method allows for flexible and in-depth data collection, focusing on thematic areas such as financial, technical, social, and institutional feasibility. At the same time, this method allowed the interviewees to freely shape their answers, as this interview method dispenses with standardized answers (Bryman 2016, 10). The semi-structured interview form was chosen to be able to ask spontaneous follow-up questions on this complex topic and to incorporate the responses into the analysis as accurately as possible.

The process took place over six interviews, each focusing on specific aspects of climate adaptation for amateur football clubs. Each interview included targeted questions on climate change perceptions and impacts, implemented adaptation strategies, financial barriers, social acceptance, and long-term adaptation goals. The questions aimed to shed light on current climate adaptation measures, their barriers, possible technical solutions, and the attitudes of association members towards these measures. All interviews were conducted in person or by telephone, with the content being voice-recorded. Following the 30 to 45-minute conversation, a written summary of the interview was prepared.

To maintain the professionalism of the results and ensure an excellent ethical presentation, all interviewees were asked verbally to publish their results after the interviews. As none of the interviewees were subject to a confidentiality clause, I could use all interviews with the results obtained. Nevertheless, the confidentiality of the interview results was a top priority, so the results were neither shared with third parties nor were the other results discussed in other interviews. For this reason, a complete interview transcription is included to document the findings and enable further analyses.

3.3.3 Analysis procedure

The interviews were analyzed using thematic analysis to gain insights into the meaning and structure of data within qualitative research. This method makes it possible to categorize many different responses from interviewees to prepare the content as well as possible for the subsequent interpretation (Braun and Clark 2006, 77-101). Thus, data familiarity was created in the first step of the analysis. The results from the responses were initially organized using a mind map with several clusters. The mind map was then organized according to the Effects of climate impacts, the feasibility of climate adaptation, and the long-term perspective. As all interviews were organized in the same way, the results of the interviewees were also in the same subject area, even if the questions were open-ended. The only difference in the answers was the content due to different experiences in the associations.

However, to answer the research question of this subchapter even more comprehensively, the feasibility of climate adaptation was analyzed in more detail as part of the thematic evaluation. The feasibility results were divided into sub-themes. Coding was developed for the respective results in the form of a keyword. Each code represents a unit of meaning extracted from the data material. This resulted in the codes for financial, technical, and social feasibility and institutional support, which also served as central themes for implementation. The code structure is explained in the diagram below.

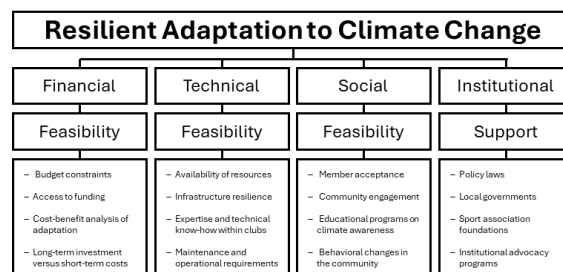


Figure 4: Coding structure, based on the topic “Resilient Adaption to Climate Change”

(Source: Own representation 2024)

The final topic review was driven forward after defining the main results and the central focus topics in the subchapter. The results were used to check whether the most important patterns and problems were correctly reflected. This approach enabled a problem definition with coherent and understandable structures to be drawn up at the end so that key statements and relevant quotes could be purposefully introduced within the interpretation. This presentation helps to fully capture and illustrate amateur football clubs' challenges and adaptation approaches to climate change.

3.4 Summary of the interview results

3.4.1 Financial feasibility

Financial feasibility remains the most pressing challenge for grassroots football clubs when implementing climate adaptation measures. Interviewees, including club managers and experts, emphasized the high costs of infrastructural projects such as drainage systems, artificial turf, and solar panels. The president of TSV Bemerode described artificial turf as an unaffordable dream, while Frank Schmidt from TSV Havelse pointed out that even grants typically cover only 30-50% of costs. The German Football Association (2022) reported that a basic drainage system costs between 400,000-500,000 euros, excluding maintenance costs, which average 3.75 euros per square meter. Many clubs struggle to finance such measures without substantial external support. While some, like TSV Havelse, attempt to secure funding through sponsorship and fundraising, smaller clubs often lack access to these resources. Political figures, such as Simone Henning from Lower Saxony's sports committee, acknowledged that bureaucratic hurdles and limited state funding slow down the process, with application periods averaging six to twelve months (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety 2023).

3.4.2 Technological feasibility and technical measures

On a technological level, drainage systems, artificial turf, and moisture-sensitive irrigation systems have proven effective in mitigating climate impacts and maintaining pitch usability.

Matthias Lambrecht reported that installing a drainage system improved pitch conditions by 40%, with players noting an increase in winter training opportunities. Global examples, such as Adelaide Oval Stadium in Australia, highlight the potential of rainwater collection and solar-powered cooling systems, which have led to a 30% reduction in electricity consumption (Amer Sports 2023). However, artificial turf also presents ecological concerns, particularly regarding microplastic pollution. Frank Schmidt from the Lower Saxony Football Association countered this by noting that newer systems use recycled rubber granules and quartz sand, offering a more sustainable compromise.

3.4.3 Social acceptance and commitment of members

Social acceptance and engagement with climate adaptation measures vary widely among clubs. While TSV Havelse has successfully integrated sustainability into its strategy, with strong support from younger members, TSV Bemerode has faced resistance, particularly from older members who see climate adaptation as a political issue unrelated to club activities. The United Nations Environment Programme (2024) found that educational workshops can increase participation in climate-related sports initiatives by 70%, underscoring the importance of awareness-building. However, volunteer-led clubs often struggle with capacity issues, prioritizing operational stability over long-term projects.

3.4.4 Institutional support and cooperation

Institutional support from sports associations and local governments plays a crucial role but remains insufficient. Programs such as "climate-friendly sports facilities" provide partial funding, as seen in the case of TSV Havelse, which received 50,000 euros for an artificial turf project. However, with conversion costs reaching one million euros, smaller clubs like TSV Bemerode find available funding disproportionate to the expenses. Bureaucratic complexities further hinder access to financial aid, prompting calls for more administrative support and training to navigate funding applications. Frank Schmidt acknowledged that while institutions

such as the NFV and DOSB recognize the issue, limited capacity has prevented them from fully addressing training and support needs.

3.5 Interpretation and synthesis of the results

3.5.1 Comparison and synthesis of the statements

The interviews highlight the diverse challenges amateur football clubs face regarding climate adaptation, with significant differences based on club size, financial resources, and social structure. While all interviewees acknowledged the necessity of adaptation, their ability to implement measures varied greatly. TSV Havelse, a semi-professional club in Germany's fourth division, benefits from strong financial resources, extensive training facilities, and a broad network of sponsors. These advantages enable the club to undertake costly projects such as artificial turf installation and drainage systems. According to Matthias Lambrecht, such measures are only feasible due to financial backing and sponsorships, indicating that well-connected clubs are better positioned to adapt. Additionally, clubs with a younger and more diverse membership structure exhibited a higher willingness to embrace sustainability initiatives. Conversely, TSV Bemerode, a seventh-division club with limited financial and physical resources, focuses primarily on maintaining basic operations. As Manfred Kohl stated, artificial turf installation is currently unrealistic due to financial constraints. While there is no outright rejection of climate adaptation, smaller clubs often require full subsidies to implement such measures, as partial funding is insufficient. The findings also show that smaller clubs face significant bureaucratic and administrative burdens when applying for funding, with volunteer-led structures lacking the capacity to handle additional workload. Without external support, particularly in funding and administrative assistance, climate adaptation remains out of reach for many amateur football clubs.

3.5.3 The role of national and local mechanisms in the implementation of climate adaptation measures

The interviews highlight the crucial role of national and local mechanisms in supporting climate adaptation in amateur football clubs. Institutional backing is essential for strengthening resilience, with municipalities and governments needing to take a more proactive role in integrating sports organizations into climate adaptation strategies.

One key approach is incorporating sports clubs into municipal climate plans, ensuring their needs are considered in decision-making. Cities could establish specific funding programs parallel to broader climate adaptation efforts. A successful example is the German Federal Ministry for the Environment's "Climate-adapted forest management" program, which demonstrates how targeted municipal support can aid local adaptation efforts. Local climate adaptation councils for sports could further enhance collaboration between governments, local authorities, and clubs. North Rhine-Westphalia has already implemented such advisory boards, which help distribute financial resources fairly and align local needs with state policies (Klimaatlas NRW 2021). These bodies could be expanded nationwide to facilitate targeted support for amateur clubs. On a national level, a dedicated "Sports and Climate Fund" could provide direct grants and low-interest loans for sustainable projects like solar panels and drainage systems. This could be financed through CO₂ tax revenues, helping to reduce greenhouse gas emissions while supporting clubs' infrastructure improvements.

Recent national initiatives, such as the German government's Climate Adaptation Strategy 2024, have begun addressing these challenges by funding climate-resilient sports projects (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety 2024). A notable example is the UEFA EURO 2024 Climate Fund, which has allocated €7 million for sustainability projects in amateur clubs, benefiting 161 organizations through measures like solar panel installations and energy-efficient heating systems (UEFA 2024). This collaboration

between international and national stakeholders demonstrates how coordinated financial support can successfully drive climate adaptation in German amateur football.

3.6 Conclusion

The study highlights that amateur football clubs vary significantly in their ability to adapt to climate change. Larger clubs, equipped with financial and infrastructural resources, can implement adaptation measures more effectively, while smaller clubs face significant limitations. This disparity underscores structural challenges that go beyond previous analyses.

A key finding is the necessity of dynamic adaptation management. Clubs could benefit from flexible, modular adaptation concepts that integrate technological solutions and social innovation processes to enhance acceptance and commitment within their communities. The role of networks and collaborations also emerges as crucial. While larger clubs leverage sponsorship networks, smaller clubs could achieve similar resilience by forming regional partnerships or pooling resources within local sports networks. This approach could reduce dependency on government funding and strengthen local adaptation efforts. Additionally, the study reveals a lack of long-term strategic planning among many clubs. Climate adaptation efforts often remain short-term, making it difficult to fully implement resilience frameworks like those proposed by Wicker, Hallmann, and Breuer. A more holistic approach, integrating climate protection into broader association development, could transform adaptation from a burden into an opportunity for modernization and community engagement. Institutional support remains a critical factor for effective adaptation. The findings indicate that current funding is insufficient, and bureaucratic hurdles deter clubs from developing long-term climate strategies. The 2024 European Football Championship has placed institutional support for amateur clubs in the spotlight, with initiatives such as the UEFA EURO 2024 Climate Fund and Germany's Climate Adaptation Strategy providing financial backing. However, sustained collaboration between political institutions and sports organizations is essential for a comprehensive and

lasting transformation in the sector. Ultimately, climate adaptation and club development should not be treated separately. By integrating climate goals into their overall strategies, amateur football clubs can strengthen their ecological responsibility while unlocking new social and economic opportunities. A holistic approach, in which clubs actively participate in climate protection, will not only enhance their sustainability but also reinforce their broader social significance. The following section explores how environmental and operational challenges, including the decline of grassroots football, affect social cohesion, community interactions, and the vital role these clubs play within local societies.

4. References

- Amer Sports. 2023. Sustainability Report 2023. Helsinki: Amer Sports, Inc.
https://www.amersports.com/wp-content/uploads/2024/05/Amer_Sports_Sustainability_Report_2023-1.pdf.
- Braun, Virginia und Victoria Clark. 2006. „Using thematic analysis in psychology.“ Qualitative Research in Psychology 3: 77-101. <https://psychology.ukzn.ac.za/?mdocs-file=1176>.
- Bryman, Alan. 2016. “Social Research Methods” 5th ed. Oxford: Oxford University Press.
- Cramer, Matthew, Daniel Gagnon, Orlando Laitano und Craig Crandall. 2021. “Human temperature regulation under heat stress in health, disease, and injury.” Physiol Rev 102 (4): 1907-1989. <https://doi.org/10.1152/physrev.00047.2021>.
- Diamond Football. n.d. "What is Grassroots Football?" Accessed October 1, 2024. <https://diamondfootball.com/news/3765/what-is-grassroots-football>.
- European Commission. 2024. “Causes of climate change.” European Commission. Accessed September 30, 2024. https://climate.ec.europa.eu/climate-change/causes-climate-change_en.
- European Football for Development Network. 2024. „DFB – Deutscher Fußball-Bund.“ Accessed November 20, 2024. <https://www.efdn.org/blog/league/dfb-deutscher-fusball-bund/>.
- Federal Institute for Sports Science. 2016. “Sport Development Report 2015/2016.“ Bonn: Bundesinstitut für Sportwissenschaft.
https://www.bisp.de/SharedDocs/Downloads/Sportentwicklungsberichte/SEB_2015_2016/SEB_2015-2016_englisch.pdf?__blob=publicationFile&v=2.

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. 2023. "Federal Climate Adaptation Act (Bundes-Klimaanpassungsgesetz – KAnG)." Berlin: Die Bundesregierung.

https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Gesetze/kang_en_bf.pdf

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety. 2023. "German Strategy for Adaptation to Climate Change" Die Bundesregierung. Accessed November 2, 2024.

<https://www.bmuv.de/en/topics/climate-adaptation/overview-climate-adaptation/german-strategy-for-adaptation-to-climate-change>.

FIFA Training Centre. "Grassroots Development." Accessed November 10, 2024.

<https://www.fifatrainingcentre.com/en/practice/grassroots.php>.

FIGC. "Grassroots Activities." Accessed October 12, 2024.

<https://www.figc.it/it/giovani/grassroots-attività-di-base/attivita-grassroots/>.

Goldblatt, David. 2020. Rapid Transition Alliance. Playing Against the Clock: Global Sport, the Climate Emergency, and the Case for Rapid Change. Accessed September 14, 2024.

https://rapidtransition.org/wp-content/uploads/2020/06/Playing_Against_The_Clock_FINAL.pdf.

Hognestad, Hans, Richard Giulianotti, Holly Thorpw, Tommy Langseth und Bieke Gils. 2022.

„Environmental Sustainability in Sports, Physical Activity and Education, and Outdoor Life.“

Frontiers in Sports and Active Living 4: 1-2. <https://www.frontiersin.org/journals/sports-and-active-living/articles/10.3389/fspor.2022.853599/full>.

IPCC. 2013. *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press.
https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf.

IPCC. 2014. *Climate Change 2014: Mitigation of Climate Change*. Working Group III Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press.
https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf.

IPCC. 2021. *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press.
https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_FullReport.pdf.

IPCC. 2022. “Climate Change: A Threat to Human Wellbeing and Health of the Planet. Taking Action Now Can Secure Our Future.” Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change.

Klimabündnis 2018. 2018. “City cycling- Cycling for a better climate.” Accessed November 16, 2024. <https://www.climatealliance.org/activities/campaigns-and-more/city-cycling.html>.

Klimabündnis 2024. 2024. “Municipal cycling campaign City Cycling still on the road to success” Accessed November 16, 2024.
<https://www.climatealliance.org/newsroom/news/news-detail/municipal-cycling-campaign-city-cycling-still-on-the-road-to-success.html>.

Klimaatlas NRW. 2021. "Climate Change Adaptation Consulting." Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen. Accessed December 2, 2024. <https://www.klimaatlas.nrw.de/node/325>.

NASA. 2024. "Aerosols: Small Particles with Big Climate Effects." Dana Bolles. Accessed December 12, 2024. <https://science.nasa.gov/science-research/earth-science/climate-science/aerosols-small-particles-with-big-climate-effects/>.

NASA. 2024. "Aerosols: The Causes of Climate Change- Human activities are driving the global warming trend observed since the mid-20th century." Accessed December 12, 2024. <https://science.nasa.gov/climate-change/causes/>.

National Oceanic Atmospheric Administration. 2023. *Arctic Report Card 2023*. Alaska: NOAA Coordinator Editor. https://arctic.noaa.gov/wp-content/uploads/2023/12/ArcticReportCard_full_report2023.pdf.

National Weather Service. 2024. "Wet Bulb Globe Temperature." Accessed December 1, 2024. <https://www.weather.gov/arx/wbgt>.

Play for Change. "Annual Report 2022." Accessed December 12, 2024. <https://www.playforchange.org>.

Regoto, Pedro, Clara Burgard und Chris Jones. 2022. *What Do We Mean by "Climate" and "Climate Change"?* 1st ed. London: Front. Young Minds.

Sport England. 2024. "Whalley Range Cricket & Lawn Tennis Club: climate adaptation and biodiversity action." Accessed November 17, 2024. <https://www.sportengland.org/guidance-and-support/facilities-and-planning/sustainability/whalley-range-cricket-lawn-tennis-club>.

Stern, Nicholas. 2006. *The Economics of Climate Change-The Stern Review*. 1st ed. London: Cabinet Office- HM Treasury.

UEFA. 2024. "Celebrating Football for Everyone." *UEFA Grassroots Week, 2024*. Accessed October 28, 2024. <https://www.uefa.com/news-media/news/0291-1bec194a7b15-d312d1765bb7-1000--uefa-grassroots-week-2024-celebrating-football-for-everyone/>.

U.S. Department of Energy. 2024. "How Much Money Can I Save With Solar Energy?" Accessed November 16, 2024. <https://www.energy.gov/eere/solar/articles/how-much-money-can-i-save-solar-energy>.

5. Appendix

A1 First Interview

The Interviewer: **Jonas Rathe (JR)**.

The Interviewee: **Frank Schmidt (FS)**. Head of CSR at the Lower Saxony Football Association (NFV)

Topic: Adaptation Strategies and Climate Adaptation in Amateur Football

1. Introduction and General Perception

JR: To what extent do you think amateur football clubs are affected by climate change?

FS: "Amateur football clubs are strongly impacted, especially by increasingly frequent extreme weather events like heavy rain, heatwaves, and drought. We see this not only as damaging sports facilities but also as an increased stress for our members. For example, summer heatwaves dry out grass fields, making it more difficult to hold regular training and raise watering and maintenance costs. Clubs in Lower Saxony, like TSV Havelse, have had to adapt their lawn care routines to protect the fields during hot summer months.

Climate change leads directly to increased costs for clubs, whether it's from water expenses or repairs after storms. According to a 2022 study by the German Football Association (DFB), 72% of amateur clubs in Germany have recognized climate-related challenges (German Football Association, 2022). There's definitely awareness, but the implementation of solutions requires both time and resources."

2. Adaptation Strategies and Technical Measures

JR: Have you already implemented any adaptation measures to address climate change? If so, which ones?

FS: "Yes, we've implemented several measures to better prepare amateur clubs for climate change. One example is installing drainage systems on sports fields to prevent flooding after heavy rainfall, allowing fields to be used more quickly afterward. A successful example is SC

Borgfeld in Bremen, which improved the playability of its fields by 40% after installing a funded drainage system (DFB, Sustainability in Football, 2023).

Another solution that has proven effective for clubs, like FC Eintracht Norderstedt, is switching to artificial turf. While artificial turf has environmental drawbacks, such as microplastics, newer systems use recycled rubber granules, offering a viable compromise. For smaller clubs, these fields are a big help since they can be played on regardless of rain or drought."

JR: Which technical measures (e.g., artificial turf, drainage systems) do you consider most important for your clubs?

FS: "Drainage systems and sustainable field maintenance are priorities because of their long-term impact. Additionally, smart irrigation systems are becoming more essential for optimizing water management. The Berlin Football Association supports clubs by providing eco-friendly solutions tailored to the exact water needs of each field (Berlin Football Association, 2023). These systems use moisture sensors that activate irrigation only when needed, saving both water and costs. Such technology enables clubs to better handle heat and drought."

JR: What technical barriers or obstacles do you see to implementing these measures?

FS: "The biggest hurdle is funding. Technical adaptation measures are often costly, and amateur clubs usually have limited financial resources. Installing artificial turf or drainage systems can cost tens of thousands of euros. For instance, SV Wacker Osterwald relied on grants to install a drainage system. Additionally, knowledge is a challenge: many club members are volunteers who don't always have the technical know-how to maintain these systems. The DFB offers training and guidance, but it's challenging for volunteers to fully acquire this expertise."

3. Financial Feasibility

JR: Are there specific adaptation measures you would like to implement that are currently unfeasible due to costs?

FS: "Yes, definitely. Many clubs would like to install solar panels to save on energy costs and become more sustainable, but the initial investment is often too high. For example, FC Union Berlin's youth academy has been powered by solar energy since 2021. For an average amateur

club, however, these systems are financially out of reach even with subsidies. Many clubs could also benefit from eco-friendly turf, but these require significant upfront costs. Another project clubs are interested in is installing heat pumps for clubhouses, but again, the expenses pose a major obstacle."

JR: Does your association have access to funding or support for climate adaptation? If so, how helpful has this been?

FS: "There are several funding opportunities, especially at the federal level and through EU programs. The German government's 'Climate Adaptation in Sports' funding guideline is a good support for climate adaptation projects. However, it often covers only 30–50% of the costs. An example is TV Friesen Telgte, which received funds from this program to improve its irrigation system. Clubs often still need to provide their own funds or find sponsors. The support is helpful but typically covers only a portion of the total cost, which remains a significant barrier for many clubs."

4. Social Acceptance and Member Engagement

JR: How do club members (e.g., players, coaches, parents) feel about climate adaptation measures? Are there any forms of support or resistance?

FS: "Overall, members are very supportive, especially younger members and parents who are aware of the long-term effects of climate change. VfL Wolfsburg, which has made sustainability central to its infrastructure, is a good example of a club with high member buy-in. Many amateur clubs report similar experiences, with high enthusiasm for climate projects, whether it's work parties for field maintenance or fundraising events. However, some resistance does exist, especially among older members who may be more skeptical of changes or investments that could temporarily disrupt regular activities."

5. Institutional Support and Partnerships

JR: Do you work with external partners (e.g., municipalities, sports federations) to implement climate adaptation measures?

FS: "Yes, partnerships with municipalities and sports federations are essential. An example is the 'Climate-Friendly Sports Field' project launched with the city of Hanover. Here, clubs collaborate with the city to create environmentally friendly fields and receive funding and technical support. We also work with the German Olympic Sports Confederation (DOSB) on training and consulting, allowing us to provide clubs with targeted information and expertise."

JR: Do you see opportunities to improve collaboration with external partners or other clubs?

FS: "Closer collaboration with local businesses would be beneficial, particularly for financing and sharing knowledge. The climate-friendly club network being piloted in the Baden-Württemberg regional association is a model we'd like to adopt. In this network, clubs share experiences and best practices, enhancing the effectiveness of adaptation measures."

6. Long-Term Perspectives, Adaptation Goals, and Limitations

JR: What are your long-term adaptation goals for your clubs in response to climate change?

FS: "Our long-term goal is for all sports facilities within the NFV to be climate-friendly and resilient. This involves not only adapting the fields but also ensuring energy-efficient clubhouses. FC St. Pauli's near-zero emissions stadium, which is partly energy self-sufficient, sets an example here. Such solutions are still challenging for amateur clubs, but we're working to provide the necessary resources and knowledge to move in this direction."

JR: What limitations or challenges do you see in implementing adaptation measures? Are there specific challenges that prevent your association from fully realizing these measures?

FS: "Primarily, it's financial resources. Even with funding programs, it's tough for many clubs to implement major measures like artificial turf or renewable energy installations, especially when municipalities are financially stretched. Bureaucracy can also delay implementation. For example, TV Jahn Delmenhorst faced a lengthy approval process for a new drainage system. These barriers make adaptation measures slower and more costly than initially planned."

A2 Second Interview

The Interviewer: **Jonas Rathe (JR)**.

The Interviewee: Manfred Kohl (**MK**). President of TSV Bemerode, Hanover

Topic: Challenges in Climate Adaptation for Amateur Football Clubs

1. Introduction and General Perception

JR: To what extent do you think TSV Bemerode is impacted by climate change?

MK: "To be honest, I don't feel that climate change has significantly impacted on our operations yet. Yes, there are more frequent heatwaves, some extreme rain, and maybe a few storms here and there, but in my view, these haven't disrupted our football activities to a degree that warrants major changes. We're a small club with limited resources, and climate adaptation just doesn't feel like a priority when the effects are not immediately visible or pressing. Most of our members are here to play football and enjoy the community. They haven't expressed any concerns about climate-related issues or shown a desire to address them, so it's difficult to justify prioritizing resources for this."

"We're aware of the broader discussions, of course, but our focus remains on the day-to-day running of the club. I think climate change feels more like a government or environmental organization issue than something we need to address at the grassroots sports level, at least right now. Until we start seeing drastic changes, it's hard to shift our priorities in this direction."

2. Adaptation Strategies and Technical Measures

JR: Have you implemented any adaptation measures at the club to address climate changes? If not, what are the main barriers?

MK: "No, we haven't implemented any specific climate adaptation measures at TSV Bemerode. Honestly, we're already stretched thin trying to maintain basic operations, so climate measures just feel like an additional burden. It's tough enough to keep our fields in decent condition, manage scheduling, and take care of general upkeep. Every new measure we'd consider would mean more work, more costs, and more time needed from our team, which we don't have. There's also a lack of awareness and understanding among our members about how these climate measures would actually benefit us directly, which makes it hard to get buy-in."

“The main barriers are time, money, and manpower. We’re largely run by volunteers, and while they’re dedicated, they already put in so many hours. To ask them to take on additional climate projects would mean stretching them even further, which isn’t realistic. Additionally, we’re not a wealthy club, and the costs of many of these measures are just not feasible for us. Most members don’t understand the long-term benefits enough to invest more time or resources, especially when their focus is on immediate, tangible club improvements rather than long-term environmental ones.”

JR: Are there any technical adaptations, like artificial turf or drainage systems, that you would consider implementing if resources were available?

MK: "Well, if money weren’t an issue, sure, we might look into things like artificial turf, which would lower our maintenance needs and withstand different weather conditions. But realistically, that’s a pipe dream right now. Installing something like artificial turf can cost tens of thousands of euros, which is just beyond our means. We struggle to cover the costs for uniforms, equipment, and regular field maintenance—things that are essential for keeping the club functioning."

“We’ve looked at options for upgrading our facilities before, but when we factor in the costs, the limited grants available, and the lack of people to lead these projects, it becomes clear that these are not feasible for us right now. Our members want to see improvements in our basic infrastructure first, so there’s limited enthusiasm for climate-related projects that don’t seem like immediate needs.”

3. Financial Feasibility

JR: Is there any climate adaptation measures you’d like to implement that currently aren’t feasible due to financial limitations?

MK: "Absolutely. I think a lot of clubs like ours would love to improve field drainage, for example, or even investigate renewable energy options like solar panels to reduce our energy bills. But it’s the costs that are the biggest deterrent. Even with subsidies and grants, which sometimes cover a percentage, the remaining amount is usually more than we can afford. And we’d need to go through a long, complex process to secure those funds. For a club like ours,

which runs on membership fees and modest sponsorships, every euro has to be carefully allocated."

4. Social Acceptance and Member Engagement

JR: How do the club's members feel about climate adaptation? Is there support or resistance?

MK: "Most of our members are indifferent, to be honest. They come here to play football and spend time with friends; they're not overly concerned with climate adaptation. When we have meetings or discussions about club needs, no one brings up climate issues. They want to see improvements that directly enhance their playing experience, like better equipment, more comfortable facilities, and smoother field conditions. Climate adaptation feels like a secondary concern at best."

"I wouldn't say there's resistance, but there's no strong interest. For many members, climate measures seem like something more suited to cities or governments. Our role, as they see it, is to provide a space for sports and the community, not necessarily to address environmental concerns. If we tried to push this agenda, I think it would be met with confusion or even frustration, as members might see it as diverting resources away from things they care about."

5. Institutional Support and Partnerships

JR: Do you work with any external partners to help with adaptation measures, or would support from associations or local government be helpful?

MK: "We don't have any formal partnerships specifically for climate adaptation, though we do work with the city on general maintenance. Even getting support for basic upkeep can be challenging enough, as we often must go through bureaucratic channels and paperwork to get funding approved. The city has helped with basic maintenance, but they have limited resources and many clubs to support, so it's always a balancing act."

"I'd welcome more support if it was straightforward and didn't require too much additional work on our part. But often, even when funding is available, the application and reporting processes are so complex that we just can't keep up. For example, some of the state and federal grants have strict requirements and lengthy processes that would require more administrative

manpower than we have. We simply don't have the personnel to handle these additional responsibilities, so often we end up missing out on support that might help."

JR: Do you think cooperation with other clubs or local partners could help?

MK: "In theory, cooperation sounds good, but practically, I'm not sure how much it would help. All the other clubs I know are dealing with similar issues—tight budgets, limited personnel, and the pressure to prioritize immediate needs. We're all in the same boat. If we had dedicated personnel to handle these kinds of partnerships and climate initiatives, it might be different. Right now, though, I think everyone is just trying to keep their heads above water with the basics."

6. Long-Term Perspectives and Limitations of Adaptation

JR: Do you see any long-term climate adaptation goals for TSV Bemerode? Are there specific challenges that would prevent your club from pursuing these measures?

MK: "Right now, our main goal is simply to keep the club running, offer good experiences for our members, and make sure our facilities are safe and usable. Talking about long-term climate adaptation goals feels unrealistic given our current resources. We're already stretched in every way—financially, in terms of time, and with the manpower we have. The idea of setting aside resources for long-term climate adaptation feels like a luxury we just can't afford."

"Our main limitations are pretty clear: a lack of time, a lack of money, and a lack of people to implement these changes. For us, taking on climate projects would mean taking away resources from our core mission of supporting our players and community. If, down the line, more substantial support becomes available, we might reconsider, but for now, our priority has to be on serving the immediate needs of our club and members. Climate adaptation, while important, just doesn't fit into our current reality."

A3 Third Interview

The Interviewer: **Jonas Rathe (JR).**

The Interviewee: **Christian Hein (CH).** Player at TSV Bemerode, Hanover

Topic: Frustration over the lack of climate adaptation measures and the club's handling of climatic challenges

1. Introduction and Perception of Climate Change at the Club

JR: In your opinion, how much are amateur football clubs affected by the consequences of climate change? What climate-related challenges have you observed in your club over the past few years?

CH: “I think, like many other amateur clubs, TSV Bemerode is affected by climate change, but the problem is not really recognized. Over the last few years, we’ve been facing extreme weather conditions more often. The summers are getting hotter, the pitches dry out, or after heavy rainfall, they become mud pits. This affects both training and matches. Often, we can’t train as planned or must postpone games because the pitches are unplayable. The weather extremes seem to be increasing, but the club doesn’t take any real action to address it. Instead, we just keep pushing forward with no real plan for adapting.”

JR: Do you personally feel that climate change is recognized as a problem in your club?

CH: “Unfortunately, no. I feel like the topic of climate change and the need for adaptation is totally ignored at the club. We talk about it a bit when we’re standing on the pitch during the summer heat and can barely see anything, but there’s no real action taken. It’s just brushed aside, as if nothing has happened.”

2. Adaptation Strategies and Technical Measures

JR: Have you implemented any adaptation measures to respond to climatic changes? If so, what?

CH: “Unfortunately, no. There has never been any real discussion or planning on how we can adapt to climate change. Once, there was talk about laying down artificial turf or improving the drainage system, but nothing came of it. I feel like these things are only brought up when we are directly confronted with problems like flooded pitches, but no concrete steps are taken.”

JR: What technical measures do you think are most important for your club?

CH: “The biggest problem is the pitches. We should seriously consider switching to artificial turf or at least investing in better drainage systems. This would allow us to keep playing even in bad weather. Especially at our club, where rain often makes the pitches unplayable, such investments would be very useful. The pitch is the heart of the club, after all.”

JR: What technical hurdles or obstacles do you see in implementing such measures?

CH: “The biggest obstacle is the money. Artificial turf and drainage systems are expensive, and the club just doesn’t have the funds for that. But I also think it’s about a lack of initiative. No one is really pushing for it, even though we all know it’s necessary. It just keeps getting postponed, but the problems aren’t going to get any smaller.”

3. Financial Feasibility

JR: Are there any adaptation measures you would like to implement but cannot be due to costs?

CH: “Definitely the artificial turf. If we had that, we could keep playing regardless of the weather, and the quality of the pitch would improve significantly. But like I said, the investment is just too high for our club. Even improving the drainage system would be helpful, but we simply lack the necessary funds.”

JR: Does your club have access to funding or support for climate change adaptation? If so, how helpful has it been?

CH: “As far as I know, there’s no concrete funding available to us. There may be some local or state funding opportunities, but we’ve never really worked on taking advantage of them. There’s just no initiative to investigate it. It would be helpful if we got more external support.”

4. Social Acceptance and Member Engagement

JR: How do club members (e.g., players, coaches, parents) feel about climate-related adaptation measures? Is there support or resistance?

CH: “I would say that most of the members don’t even think about it. There are some players who do care, but the majority are more focused on sport and less on climate change. The coaching staff feels the same way—they’re more concerned with organizing the games and keeping training going. Parents and members usually support us, but not actively when it comes to long-term issues like this. There’s no real push or awareness that we need to act now.”

JR: How strong is engagement within the club for sustainable adaptations to climate change?

CH: “Unfortunately, the engagement is very low. As I said, the topic comes up every now and then, but it’s never followed through. We talk about how we could improve things, but without concrete actions and leadership from the club’s management, the engagement never really takes shape.”

5. Institutional Support and Cooperation

JR: Do you collaborate with external partners (e.g., municipalities, sports federations) to implement climate adaptation measures?

CH: “Unfortunately, no. We don’t have any partnerships with external organizations that could help us implement adaptation measures. We’ve never really thought about how to get support from sports federations or the city. There’s just no initiative in that direction.”

6. Long-Term Perspectives and Adaptation Goals

JR: What long-term adaptation goals do you have for your club in relation to climate change?

CH: “Long-term, I hope the club will finally start taking this issue seriously. The goal should be to improve the infrastructure so that we can keep playing no matter what the weather and at the same time enable more sustainable use of our resources. This includes artificial turf, but also better pitch maintenance and a more sustainable energy supply.”

JR: Are there any ideas or projects you would like to pursue if resources and support were available?

CH: “If we had the resources, I would love to see us switch to artificial turf and redesign the entire facility to be better suited to the climatic conditions. A partnership with the city or sports

federations could help us with that. But it all depends on whether the club has the will to take these issues seriously and take action.”

A4 Fourth Interview

The Interviewer: **Jonas Rathe (JR)**.

The Interviewee: **Matthias Lambrecht (ML)**. Sustainability Manager at TSV Havelse

Topic: Successful implementation of a sustainability strategy, with financial limitations

1. Introduction and General Perception of Climate Change Impacts

JR: How much do you think amateur football clubs are affected by the consequences of climate change? What climate-related challenges have you observed in your club in recent years?

ML: "Amateur football clubs, especially those like ours, are increasingly affected by the consequences of climate change. We notice the extreme weather conditions more and more. The hotter summers with increased drought risks and sudden heavy rainfall are common challenges we face. Our grass pitch suffers in heavy rain due to poor drainage, and on hot summer days, we struggle to maintain the quality of our fields. These challenges are becoming more problematic unless we take action."

2. Adaptation Strategies and Technical Measures

JR: Have you already implemented adaptation measures to respond to climate change? If so, which ones?

ML: "Yes, we've already taken some measures. A few years ago, we decided to focus on making our infrastructure more environmentally friendly. One of the most important decisions was to modernize the drainage system of our pitch to improve water runoff during heavy rains. This alone cost around 80,000 euros. We also installed an artificial turf pitch, which has helped us maintain the field even during hot summer months. This installation cost about 1.000.000 euros. However, the biggest challenge has been the financing of these projects."

JR: Which technical measures do you consider most important for your club?

ML: "The key technical measures for us are improving pitch infrastructure and installing energy-efficient systems. The artificial turf and the new drainage system have been crucial steps. Other measures we want to implement include a rainwater harvesting system to irrigate the pitch and the installation of solar panels on our buildings to reduce our energy consumption. Expanding the solar system would cost us about 150,000 euros, and the rainwater system is estimated at 50,000 euros."

3. Financial Feasibility

JR: Are there any adaptation measures that you would like to implement but cannot be due to cost constraints?

ML: "Yes, there are many ideas we would love to implement, but they are just financially unfeasible. For example, we want to expand our solar panel system or install green roofs on our buildings to improve energy efficiency. These projects are very costly – just expanding the solar system would cost at least 200,000 euros. Without strong financial support, we wouldn't be able to complete these projects. We are fortunate to have large sponsors who support us, but that's not the norm for all amateur clubs."

JR: Does your club have access to funding or support for climate adaptation? If so, how helpful have these been?

ML: "Yes, we have received some funding and support. Our main sponsors not only provide financial resources but also help raise awareness about the importance of sustainability. For example, we received a 50,000 euro grant through the "Climate-Friendly Sports Operations" program from the German Football League (DFL) for the installation of the artificial turf. This funding was crucial for us to carry out the project. In addition, we received a subsidy of 250,000 euros from the City of Hannover for the new pitch."

4. Social Acceptance and Member Engagement

JR: How do the club members (players, coaches, parents) feel about climate-related adaptation measures? Is there support or resistance?

ML: "Generally, the reactions are positive. Especially younger players are very aware of the importance of sustainability and support such measures. Coaches and parents also understand the need for change. However, for larger investments like solar panels or the use of sustainable materials in new buildings, there have been some concerns, mainly due to the high costs involved in these measures."

5. Institutional Support and Partnerships

JR: Do you work with external partners (e.g., municipalities, sports associations) to implement climate adaptation measures?

ML: "Yes, we collaborate with various external partners. For example, we worked with the City of Hannover to implement our rainwater system. We've also exchanged ideas with the Lower Saxony Football Association on various sustainable projects and have benefited from their expertise. However, I believe the collaboration could be stronger to make the implementation of sustainable projects easier for all clubs."

6. Long-term Perspectives and Adaptation Goals

JR: What long-term adaptation goals do you have for your club regarding climate change?

ML: "In the long term, we aim to become a model club for sustainability in amateur football. We want to continuously reduce our environmental impact and increase the resilience of our infrastructure to climate challenges. A future goal would be to cover all our energy needs with renewable energy, use our resources more efficiently, and reduce our carbon emissions. Of course, this is only possible with solid financial backing, which is why we are focusing on expanding our network of sponsors and supporters."

Question: Are there any ideas or projects that you would like to pursue if resources and support were available?

ML: "Yes, we have several ideas. One of them is to expand our solar energy systems to reduce our long-term energy costs. We also aim to set up an educational program for the local community to promote sustainability in sports. If we had more financial resources and support, we could implement these projects much faster."

A5 Fifth Interview

The Interviewer: **Jonas Rathe (JR)**.

The Interviewee: **Anthony Bright (AB)**. Young Player at TSV Havelse

Topic: Climate Adaptation Measures in Football – Focus on Financial Issues and Volunteering

1. Introduction and General Perception of Climate Change Impacts

JR: How much do you think amateur football clubs are affected by the consequences of climate change? What climate-related challenges have you observed in your club over the past years?

AB: "The impacts of climate change are definitely noticeable, even though our club has already taken some steps. Especially the weather extremes we've seen over the past few years—hot summers and heavy rain—make it harder to keep the pitches in good condition. Here at TSV Havelse, we already have artificial turf, which has really helped us avoid cancellations due to the weather. Without the artificial turf, we'd have had more match cancellations due to heavy rain or heat. But even with the artificial turf, climate change is still an issue, especially when it comes to other infrastructure needs."

2. Adaptation Strategies and Technical Measures

JR: Have you already implemented any adaptation measures to respond to climate change? If yes, what were they?

AB: "Yes, we've installed artificial turf, which has been really helpful in avoiding weather-related cancellations. The artificial turf ensures that we can play in almost any weather, which is crucial for keeping the match schedule intact. We've also improved the drainage system on the artificial turf fields to prevent flooding during heavy rain. This has stabilized the playing surface and ensures consistent conditions."

JR: What technical measures do you think are most important for your club?

AB: "The artificial turf was definitely one of the most important measures to keep the games going despite extreme weather conditions. Additional measures like improving irrigation and

drainage systems would be useful to ensure the artificial turf remains in good shape over time. There's also consideration for upgrading the lighting so that training sessions can be held at more flexible times, especially as we experience longer and darker winter evenings."

JR: What technical challenges or obstacles do you see in implementing these measures?

AB: "The biggest hurdle is still financing. Even though the artificial turf has helped a lot, there are other infrastructural needs that are costly. Additional floodlights or even better irrigation systems are expensive, and without external financial support, we can hardly afford these projects. The club cannot bear these costs on its own, and that's a real issue, especially when we know how necessary these investments are."

3. Financial Feasibility

JR: Are there any adaptation measures you would like to implement but cannot be due to costs?

AB: "Yes, we'd love to do more in terms of sustainability and climate adaptation, but the costs are a barrier. Projects like expanding the artificial turf or installing solar panels on the club buildings would be great steps forward, but they are just too expensive. We managed to install the artificial turf thanks to strong sponsors, but without more external financial help, we can hardly take on such projects."

JR: Does your club have access to funding or support for climate change adaptation? If so, how helpful has this been?

AB: "The club has received some grants for the artificial turf in the past, which has been great. But beyond that, there's very little support, especially when it comes to larger projects. We've also received funding for improving the drainage, but overall, the financial resources are limited. There's definitely potential for more support if more public funding or grants for sustainable climate adaptation measures were available."

4. Social Acceptance and Member Engagement

JR: How do the club members (players, coaches, parents) feel about climate-related adaptation measures? Is there support or resistance?

AB: "Most members are supportive of the adaptation measures, especially since we installed the artificial turf. The players appreciate being able to play in any weather. Some of the older members and parents are a bit concerned about the high costs of such projects, as they question whether these investments are worth it in the long run. But overall, I think everyone understands that we have to respond to climate change, and as a club, we need to adapt."

5. Institutional Support and Partnerships

Question: Do you work with external partners (e.g., municipalities, sports associations) to implement climate adaptation measures?

AB: "Yes, we worked with the city of Hanover to fund the artificial turf. That collaboration worked really well. However, there aren't enough such partnerships to implement all the necessary adaptation measures. More support from municipalities or sports associations would be extremely helpful, especially to better distribute the financial burden."

6. Long-Term Perspectives and Adaptation Goals

JR: What long-term adaptation goals do you have for your club regarding climate change?

AB: "In the long run, we want to make the entire club more climate friendly. The artificial turf was an important first step, but we also want to optimize energy use, such as installing solar panels and using rainwater more effectively. It's important for us not only to focus on the playing surface but to make the entire club's infrastructure more sustainable."

A6 Sixth Interview

The Interviewer: **Jonas Rathe (JR).**

The Interviewee: **Simone Henning (SH).** Assistant at the Lower Saxony Sports Committee, Ministry of the Interior

Topic: Successful implementation of a sustainability strategy, with financial limitations

1. Introduction and General Perception

JR: In your opinion, how are amateur football clubs affected by the impacts of climate change? What climate-related challenges have you observed in recent years?

SH: "The effects of climate change on amateur football clubs in Lower Saxony are quite tangible. Over recent years, we've seen an increase in heatwaves, heavy rainfall events, and longer dry spells, which place significant strain on pitches and club infrastructure. Many clubs are dealing with deteriorating field conditions and a rise in match cancellations. These changes are pushing clubs to seek long-term solutions for adaptation."

2. Adaptation Strategies and Technical Measures

JR: What adaptation measures have you implemented at the state level for the sports sector? Which technical measures do you consider particularly important?

SH: "Artificial turf fields play a central role in adaptation strategies since they manage extreme weather better than natural grass pitches. Drainage systems are also crucial for preventing flooding. Through the program 'Niedersachsen dreht auf' (Lower Saxony Ramps Up), the state funds some measures, though resources are limited. Infrastructure investments are substantial, and clubs often need additional funding. Recent grants have been allocated to field renovations and energy-efficient lighting projects to reduce energy consumption."

3. Financial Feasibility

JR: Are there specific adaptation measures you'd like to implement but find infeasible due to costs? What funding programs exist in Lower Saxony, and how helpful are they?

SH: "Certain adaptation measures are indeed challenging due to high costs. The Ministry of the Interior and Sports in Lower Saxony has introduced various funding programs, such as the Sportstättenförderprogramm Niedersachsen (Sports Facilities Funding Program), supporting measures like field and facility construction or renovation with a focus on climate adaptation. However, financing these initiatives remains challenging, as the state can only support a limited number of projects. Programs like the Gemeinschaftsaufgabe 'Verbesserung der regionalen Wirtschaftsstruktur' (Joint Task for Improving Regional Economic Structure, or GRW) offer funding in structurally weak regions, but they often require co-financing from municipalities."

4. Institutional Support and Cooperation

JR: How does Germany's federal system impact the funding of climate adaptation measures? How can federal and state governments work together?

SH: "In Germany, sports club funding is organized federally, meaning both the federal and state governments are responsible for certain subsidies. Limited state funds mean Lower Saxony relies on federal funds for larger, costlier projects. However, federal funds often come with specific requirements and bureaucratic hurdles, which are challenging for smaller clubs. The federal program Climate Resilience in Sports aims to support clubs in adapting to climate change, but many clubs struggle to meet their requirements. Closer coordination between federal and state levels would help allocate funds more efficiently."

Source: *Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, "Sports Facilities Funding and Climate Resilience in Sports," 2023.*

5. Long-Term Perspectives and Adaptation Goals

JR: What are Lower Saxony's long-term goals regarding climate adaptation measures in sports? Are there plans for additional funding programs?

SH: "Lower Saxony's long-term goal is to provide amateur sports clubs with resilient and sustainable infrastructure. This includes promoting artificial turf, drainage systems, and energy-efficient lighting. The state plans to expand existing funding programs, though the realization of these plans heavily depends on available resources. We are also working to place greater emphasis on ecological sustainability in these programs, such as using recycled materials in sports field construction."

Source: *Lower Saxony Ministry of the Interior and Sports, "Sustainability Strategy Lower Saxony 2022."*