MINISTÈRE
DES SPORTS,
DE LA JEUNESSE
ET DE LA VIE ASSOCIATIVE

*Liberté*
*Égalité*
*Fraternité*

# FIRST NATIONAL CLIMATE CHANGE ADAPTATION PLAN FOR SPORT

## PNACC SPORT 2024-2030

How adaptation challenges intersect with mitigation goals

# Credits and acknowledgements

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This plan has been produced based on the contributions of various individuals and bodies. We would like to thank the stakeholders and skilled experts who agreed to share their experience in the course of interviews and workshops (detailed list of contributors provided in appendix).
We would also like to thank everyone who took part in the online public consultation and who, in doing so, contributed ideas to the list of adaptation measures, which were subsequently discussed in workshops.
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**Cover photo credit:** iStock

# Contents

# Introduction

*For almost 20 years, the French Ministry of Sport has been addressing environmental challenges by developing strategies to reduce the impact of sport on the environment.*

*The direct and indirect effects of climate change on the sports sector are becoming increasingly pronounced. The increasing number of heatwaves, the change of flows in watercourses, wildfires and extreme climate events, and changing snowfall patterns are modifying sporting performance and the places where sports are practised.*

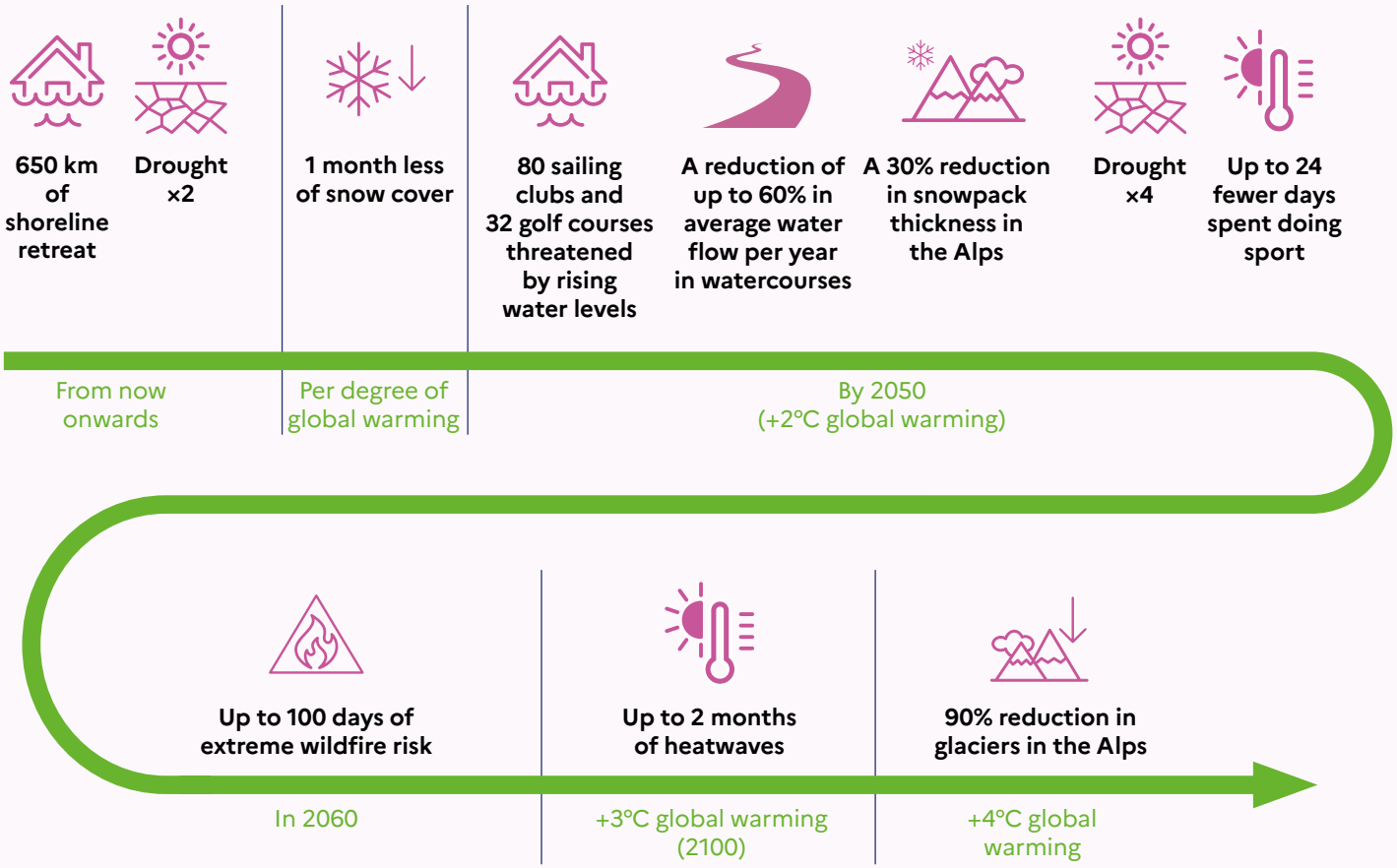
*The National Climate Change Adaptation Plan for Sport (PNACC sport) sets out the main measures to be put in place by 2030 in order for sport to adapt to climate change and help boost the resilience of France's regions.*

*This report is the result of a collaborative effort between all stakeholders in the sports sector over a period of almost two years; it provides an overview of the various ways in which climate change impacts sport, and lists 30 adaptation measures (including 6 key measures). The aim is to help to pave the way for adapting sports activities in line with France's national baseline global warming trajectory for climate adaptation (TRACC). This represents Sport's contribution to the PNACC-3, which was published for consultation in October 2024. It serves as a starting point, and is intended be reviewed and adapted if assumptions relating to global warming change.*

*Like most human activities, sport is both jointly responsible for, and a casualty of, the effects of climate change. Adapting these activities to the consequences of this change, while also limiting their impact on the climate, is undoubtedly the only viable solution in order to preserve our engagement in sport and its many benefits. As in many other areas, sport aims to set an example!*

# Overview

## Illustrations of the impacts of climate change per climate hazard



# Examples of the impacts of climate change on sport

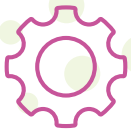
**PRACTITIONERS**

Impaired performance in wet conditions

Risk of injury on hard pitches

**SPECTATORS & OTHER AUDIENCES**

Safety affected by severe weather events



**PRACTICE CONDITIONS**

Fewer opportunities for practising whitewater sports where water flow is limited

**SPORTS CALENDARS AND SEASONS**

Outdoor sport seasons potentially affected by risk of wildfire

**PITCHES & OTHER SURFACES**

Pitch maintenance is harder due to water shortages

**JOBS**

Increased need for lifeguards during extremely hot weather

**ECONOMIC MODELS**

Winter sports events no longer being held due to poor snow cover

**INFRASTRUCTURES**

Coastal buildings vulnerable to shoreline retreat

# The six main measures for adapting sport to climate change

- Undertaking **studies on sport's vulnerability to climate change** based on the TRACC, in order to identify safe (climate) conditions for sport, per type of sports venue and per discipline.
  - ▶ *For example, a study on the vulnerability of winter sports to climate change.*
- For sports' decision-makers and elite athletes, **devising and implementing a joint awareness-raising and training programme on the challenges involved in adapting to climate change,**
  - ▶ *Mirroring the "Mon parcours transition écologique" ("My Ecological Transition Pathway") programme for senior government officials.*
  - ▶ *Building on existing events for athletes, such as "Climate sport camps" or "Sport for future".*
- **Making public funding** conditional on environmental performance, by implementing criteria relating to climate change resilience and moderation.
  - ▶ *For example, funding for the "5,000 terrains de sport - Génération 2024" ("5,000 Sports Grounds - 2024 Generation") plan from the ANS.*
- Ensuring that, within each federation or as part of Government-supported major sports events, recommendations and **rules for "adapted" sports activity** are adopted whenever the climate conditions and minimum resources required to perform the sport safely cannot be met.
  - ▶ *For example, playing touch rugby when the pitch is too dry.*
- Experimenting**with solutions to help professions that are vulnerable to climate change** to evolve.
  - ▶ *For example, creating bridges between qualifications to help coaches become multi-skilled, and developing multi-activity models.*
- **Monitoring, as part of a joint oversight body, the implementation and outcomes of the PNACC Sport**.

# Document overview

## Objectives and scope

The aim of the PNACC sport is to identify the measures that need to be implemented in mainland France by 2030, with a view to adapting sports activities to the impacts of climate change.

It is based on the baseline global warming trajectory set by the government, which uses the following global warming benchmarks: +1.5°C by 2030, +2°C by 2050 and +3°C by 2100 globally, causing temperatures in mainland France to increase by around +2°C by 2030, +2.7°C by 2050 and +4°C by 2100 compared to pre-industrial levels.

The PNACC sport covers all amateur and professional sports activity. The impact of climate change on all aspects of sporting activities (such as disciplines, sports venues and infrastructure, and events) are explored.

The adaptation measures address both the physical and the indirect effects of climate change, such as the impact on how a sporting discipline is perceived (acceptability), as well as some of the health-related, regulatory, economic and organisational risks. However, the geopolitical, social and macro-economic repercussions of climate change are not explored.

## How should this document be read?

This document is divided into two sections:

- The first section provides an overview of the ways in which sport is affected by climate change. It lists the main risks and their indirect effects that sport must adapt to, followed by the main impacts on sport itself, and how the sector will need to adapt to climate-related hazards and indirect effects as they pertain to individual aspects of sport (such as participants, sporting venues and discipline formats).

- The second section identifies a set of adaptation measures for sport that must be instituted by 2030 in order to start the process of adapting sports activity to climate change.

For this second section, three priorities have been adopted with a view to driving progress and delivering outcomes, covering:

1. An overview of the current state of affairs, including any adaptation solutions already in place,
2. The issue of resources required for an operational plan,
3. The desired outcome, i.e. all aspects of the sports sector being adapted to new climate conditions.

Each priority is broken down into objectives (9 in total) and then into measures (30 in total).

This document is part of a continuous process of improvement and ongoing consolidation. The objectives outlined in this report should be viewed as steps toward progress, and not final targets.

**KEY FIGURES**

**10** climate hazards identified

**5** indirect effects of climate change taken into account

**12** thematic sub-groups of sport disciplines set up

**88** bodies consulted

**146** online contributors

**252** measures proposed online and developed in the workshops

**3** priorities, **9** objectives and **30** proposals including 6 key measures

# Methodology

There were five key stages involved in drawing up the PNACC sport:

1. Identifying the challenges for each discipline and type of sports venue, based on a series of interviews conducted by experts in order to set up groups of disciplines to which similar adaptation measures could be applied;
2. Creating an overview of the effects of climate change on all sports activities, via 12 workshops with representatives from various disciplines grouped together based on the challenges identified in the previous step;
3. Public consultation in order to ensure wide circulation of the overview of the effects of climate change on sports, gathering as many proposals for adaptation measures as possible and facilitating the adoption of the PNACC sport;
4. Identifying and prioritising adaptation measures for each group of disciplines, over the course of 5 workshops bringing together representatives of the various disciplines;
5. Formalising the plan.

**IDENTIFYING THE CHALLENGES FOR EACH DISCIPLINE (EXPERT INTERVIEWS), THEN IDENTIFYING THE EFFECTS OF CLIMATE CHANGE ON SPORT FOR EACH GROUP OF DISCIPLINES (12 WORKSHOPS)**

- Sports practised on grass pitches
- Sports activities in open stadiums or urban environments
- Indoor sports
- Sports in swimming pools
- Whitewater sports
- Water sports in natural surroundings
- High-altitude sports and winter sports
- Land-based outdoor sports
- Underwater sports
- Sports on ice
- Aerial sports
- Equestrian sports

**OVERVIEW OF THE IMPACTS OF CLIMATE CHANGE ON SPORT**

**GENERATING IDEAS**

**Public consultation**
**146 online contributors**
**252 online proposals developed in workshops**

**IDENTIFYING AND PRIORITISING MEASURES (5 WORKSHOPS)**

- Sports in open stadiums or urban environments
- Indoor sports, sports in swimming pools and sports on ice
- Water and underwater sports in natural surroundings
- Land-based outdoor and aerial sports
- Winter and high-altitude sports

**PNACC SPORT**

PART 1

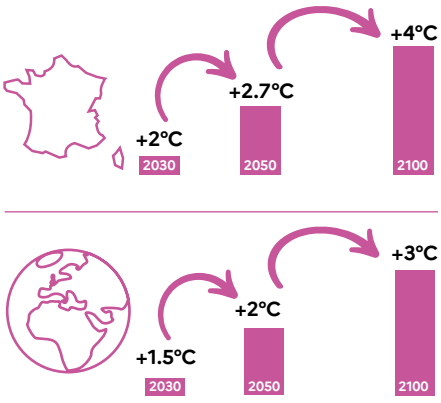
# OVERVIEW OF THE EFFECTS OF CLIMATE CHANGE ON SPORT

This section provides an **overview of all of the effects of climate change on sport**. Firstly, it lists the main climate change hazards and their indirect effects which sport must adapt to. Secondly, it lists the main impacts on sport caused by climate hazards and the indirect effects of climate change.

# Climate hazards and indirect effects

## Rise in average temperatures

Since the end of the 19th century, the average global temperature has risen by at least 1.1°C, which equates to a rise of 1.7°C in mainland France and 2.3°C in the Alps specifically. We can expect a rise in average global temperatures of +1.5°C by 2030, +2°C by 2050 and +3°C by 2100, causing temperatures in mainland France to increase by around +2°C by 2030, +2.7°C by 2050 and +4°C by 2100 compared to pre-industrial levels[1].




# Climate hazards

## Extreme heat

Climate change is increasing the frequency, severity and length of periods of very high temperatures and heatwaves. In a +2°C global warming scenario, we should expect up to 24 additional days per year of temperatures over 32°C in France; above this threshold, engaging in sport is not advised. This may also lead to 5 to 20 additional days of heatwaves for almost half of French stadiums, affecting 16,309 stadiums for amateurs and professionals[2].

In a +3°C global warming scenario, heatwaves in some regions may last for periods exceeding one or two months in the summer, and there may be 40 to 50 tropical nights[3] per year (possibly 90 in the most hard-hit areas[4]).

***The following are particularly impacted:***

- *The health of the participants and their performance,*
- *The health of spectators, staff members, service providers and others,*
- *The use of infrastructures and sports sites, based on their "thermal comfort",*
- *The continued operation of some amenities,*
- *Management and maintenance of playing surfaces,*
- *Sports calendars and seasons,*
- *The need for lifeguards and mountain personnel.*

*The 2022 heatwave reduced the number of active runners by 15%[5].*

*The women's marathon at the 2019 World Athletics Championships in Doha was the slowest in history, and also saw a high number of non-finishers (28 out of 68 participants), despite being held at night[6].*

1. La trajectoire de réchauffement de référence pour l'adaptation au changement climatique (TRACC), Ministère de la transition écologique et de la cohésion des territoires.
2. Dérèglement climatique : le sport à +2°C et +4°C, WWF France, 2021
3. when temperatures do not fall below 20°C
4. La trajectoire de réchauffement de référence pour l'adaptation au changement climatique (TRACC), Ministère de la transition écologique et de la cohésion des territoires.
5. Observatoire du running 2023), Sport Heroes & Union Sport et cycle
6. Sport et transition écologique: à vos marques, prêts, jouez ! Ademe Magazine, summer 2024

## Drought / reduced water levels

Rising temperatures are leading to droughts becoming more severe for extended periods. This is creating problems for whitewater sports, water sports in inland bodies of water, the maintenance of pitches, the condition of sports facilities, etc.

In a global warming scenario where temperatures rise by over 3°C, there will be around 4 times as many droughts as in the pre-industrial age, whereas today, there are twice as many[7].

By 2050, we should expect an overall reduction in the average annual water flow in the whole of mainland France of approximately 10% to 40% for most water basins, and approximately 10% to 60% for watercourses in the foothills of the Pyrenees[8].

***The following are particularly impacted:***

- *Buildings and other infrastructures, the management and maintenance of surfaces and natural sports sites, artificial snow production and the filling, maintenance and draining of swimming pools,*
- *The health of the participants and their performance,*
- *Equipment maintenance,*
- *The ability to practise sports in inland bodies of water and in watercourses,*
- *Sports calendars and seasons.*

*In 2050, at the whitewater centre near Pau, the minimum level of water flow for whitewater sports (7 m³/s) is only expected to be achieved on 270 days per year, compared to the current figure of 361 days[9].*

## Heavy rainfall

Although these events vary, extreme rainfall (total daily rainfall of over 200 mm) is becoming an increasingly regular occurrence around the Mediterranean basin. Heavy rainfall may result in rises in water levels, flooding and landslides, which can affect sports venues and infrastructure and impact sports events, etc.

In a scenario of a rise of over 3°C, the costs arising from flooding in Europe would rise from 7.8 billion euros to 48 billion euros per year[10].

***The following are particularly impacted:***

- *Natural sports sites and access to them,*
- *Sports facilities set up in or near areas that are prone to flooding,*
- *Sites and disciplines using watercourses.*

## Rising humidity levels

Warmer air can hold greater quantities of moisture.

Heat is eliminated from the human body when sweat evaporates. This means that, if there is too much humidity in the air, the human body overheats, making sport dangerous or impossible.

***The following are particularly impacted:***

- *The health of the participants and their performance,*
- *The health of spectators, staff members, service providers and others,*
- *Management and maintenance of playing surfaces.*

7. La trajectoire de réchauffement de référence pour l'adaptation au changement climatique (TRACC), Ministère de la transition écologique et de la cohésion des territoires.
8. Rapport de synthèse Hydrologie de Surface, projet Explore 2070, Eau et changement climatique, Ministère de l'écologie, du développement durable et de l'énergie
9. Quel sera l'impact du changement climatique sur le sport en 2050 ? Axa Climate, Sport 1.5. 2024
10. La trajectoire de réchauffement de référence pour l'adaptation au changement climatique (TRACC), Ministère de la transition écologique et de la cohésion des territoires

## Snow cover

Global warming affects the duration, quantity and quality of snow cover, as well as the stability of snowpack (avalanches and landslides).

In a global warming scenario involving a 2°C rise, there will be an estimated 30% reduction in winter snowpack in the Alps. For every degree warming in the future, we can expect one month less of snow cover[11].

***The following are particularly impacted:***

- *Sports calendars and seasons,*
- *Artificial production of snow,*
- *The seasonal opening of shelters near to routes.*

## Wildfire risk

Extreme heatwaves and major droughts will result in higher numbers of severe and / or rapidly-spreading wildfires. Vulnerable areas now include mountainous regions, and extend beyond the Mediterranean region.

Where there is high risk of wildfire, sports may be prohibited at certain times in these areas. By around 2060, the majority of the country will face this extreme risk for 10 to 20 days per year, while regions along the Mediterranean coast and along the Rhone will face this risk for 80 to 100 days per year[12].

***The following are particularly impacted:***

- *Natural sports sites and access to them,*
- *Sports calendars and seasons.*

*In the département of Bouches-du-Rhône, the general public is prohibited from entering natural parks during periods of very high wildfire risk, as humans are responsible for 90% of fires that break out. By 2050, the number of days that these parks will be closed may double, meaning 21 fewer days for sport per year compared to the present day[13].*

## Rising sea levels

In all French coastal regions, rising sea levels are resulting in shoreline changes. 650 km of coastline is retreating, with 270 km doing so at an average speed of 50 cm per year[14]. The retreating shoreline is accelerating the erosion of beaches, the destruction of coastal ecosystems and the salinisation of coastal landscapes.

***The following are particularly impacted:***

- *Management and maintenance of playing surfaces,*
- *Buildings and other sports infrastructure on the coast, and access to them,*
- *Sports sites near coastal areas, and access to them.*

*In a +2°C world, one in seven coastal sailing clubs will be threatened by rising sea levels[15], and 32 golf courses will be completely submerged (5% of the total surface area of France's golf courses)[16].*

11. Dérèglement climatique : le sport à +2°C et +4°C, WWF France, 2021
12. Rapport d'information n°511 (2018-2019) Adapter la France aux dérèglements climatiques à l'horizon 2050 : une urgence déclarée, Sénat
13. Quel sera l'impact du changement climatique sur le sport en 2050 ? Axa Climate, Sport 1.5. 2024
14. La trajectoire de réchauffement de référence pour l'adaptation au changement climatique (TRACC), Ministère de la transition écologique et de la cohésion des territoires.
15. Dérèglement climatique : le sport à +2°C et +4°C, WWF France, 2021
16. 40 golfs sont menacés par la montée des eaux en France, Golf Planète

## Extreme weather conditions

Global warming is increasing the number of extreme weather events, which could put participants at risk, disrupt the organisation of sports events and even damage sports infrastructure. In a scenario where global warming reaches +3°C, the frequency of severe tropical cyclones will be approximately 50% higher than in a scenario where temperatures rise by 1.5° C[17].

***The following are particularly impacted:***

- *Buildings and other sports infrastructure, and more specifically the management and maintenance of playing surfaces,*
- *Natural areas where sports are practised, and access to them,*
- *The safety of sports activities,*
- *The ability to engage in sports in watercourses,*
- *Organising and broadcasting sports events,*
- *Sports calendars and seasons.*

*The Tour de France cancelled stage 19 in 2019 due to hail, snow and landslides on the Col de l'Iseran.*

## Melting glaciers and permafrost, and disruption to the freeze-thaw cycle

Climate change is accelerating the melting of glaciers and permafrost, making glacial areas and mountain peaks increasingly unstable. In addition, disruption to freeze-thaw cycles could affect sports facilities and access routes. If nothing is done to reduce our greenhouse gas emissions, by the end of the century over 90% of the Alps' glaciers may disappear[18].

***The following are particularly impacted:***

- *Buildings and other sports infrastructures,*
- *High-altitude sports facilities and venues,*
- *Sports calendars and seasons.*

17. La trajectoire de réchauffement de référence pour l'adaptation au changement climatique (TRACC), Ministère de la transition écologique et de la cohésion des territoires.

18. Modelling the future evolution of glaciers in the European Alps under the EURO-CORDEX RCM ensemble. Harry Zekollari, Matthias Huss, and Daniel Farinotti, 2019

# Climate hazards

**UP TO 24 ADDITIONAL DAYS > 32°C**

(at +2.7°C of warming in France)

**UP TO 2 MONTHS OF HEATWAVES**

(at +4°C of warming in France)

**UP TO 90 TROPICAL NIGHTS PER YEAR**

(at +4°C of warming in France)

**1.5 TIMES MORE TROPICAL CYCLONES**

(at +4°C of warming in France)

**90% REDUCTION IN GLACIER VOLUME IN THE ALPS**

(at +4°C of warming in France)

**30% REDUCTION IN WINTER SNOWPACK IN THE ALPS**

(at +2.7°C of warming in France)

**1 MONTH LESS OF SNOW COVER**

per degree of global warming

**A REDUCTION IN THE WATER FLOW OF WATERCOURSES BY UP TO 60%**

(by 2050)

**4 X MORE DROUGHTS**

(at +3°C of global warming)

**650 KM OF SHORELINE RETREAT**

(now)

**UP TO 100 DAYS OF WILDFIRE RISK**

(in 2060)

# Indirect effects

## Health risks

The Intergovernmental Panel on Climate Change (IPCC) has identified 8 health risks that may be exacerbated by climate change. They are associated with malnutrition, heat, diseases transmitted via food and water, extreme weather events, occupational health, infectious diseases, air quality and mental health.

There are 17 types of occupational risks listed by the French National Agency for Food, Environmental and Occupational Health & Safety (ANSES), 15 of which will potentially be exacerbated by climate change, including biological risks and risks of collapse, poor sanitation and even falls[19].

## Identity / nature of the discipline

Adaptations to sports activities can lead to changes in key aspects within a discipline (such as how often major events are held, developing playing surfaces and infrastructures, and the reduced consumption of resources).

*In 2019, a long-distance triathlon was forced to reduce its regulation race distances in response to extreme temperatures.*

## Regulation

In a context of increased pressure on ecosystems, environmental protection regulations may restrict some sports activities, the organisation of events and the construction of new infrastructures, such as restrictions on using water resources and restricted access to areas where sports are practised, for the purposes of protecting biodiversity or due to increased wildfire risk, etc.

***The following are particularly impacted:***

- *Management and maintenance of surfaces,*
- *Access to natural sports sites,*
- *Specific disciplines, including those which use fossil fuels,*
- *Geographic location of events.*

19. Evaluation des risques induits par le changement climatique sur la santé des travailleurs ("Evaluation of climate change risks on occupational health") Opinion issued by the ANSES; collective expert appraisal report. January 2018

## The image of sport

Given the context of climate change, the general public's attitude towards the acceptability of certain practices (such as transport, pitch watering and the use of artificial surfaces) is shifting, occasionally resulting in high levels of cognitive dissonance for athletes. The appeal of sports hinges on their ability to take social and environmental issues on board.

*69% of sports fans have stated that they are willing to reduce their sport-related outings in order to reduce their ecological impact[20].*

## Economic

Across all sectors of the economy, we are seeing a significant rise in energy and transport costs, raw materials becoming scarcer, supply issues, etc. In a global warming scenario with an average rise of +3°C, and where no adaptation measures are put in place, France could see its gross domestic product fall by 13.1%[21]. In addition, some insurance companies and financiers are already unwilling to risk covering certain activities and/or events. For example, climate change accounts for 35% of the projected increase in the cost of insurance, mostly in the form of the risk of droughts and coastal flooding[22].

***The following are particularly impacted:***

- *The operating cost and thermal comfort of sports infrastructures,*
- *Management and maintenance of playing surfaces,*
- *The filling, maintenance and draining of swimming pools,*
- *Economic models (including some competitions no longer being held (particularly high-altitude events), and the administrative closure of shelters or mountaineering areas, etc.).*

*Around half (56%) of the total extra cost of inflation in sports facility spending (i.e. 840 million euros[23]) comes from spending directly linked to energy consumption.*

20. Meaningful Passions, Havas Sports & Entertainment 2021
21. La trajectoire de réchauffement de référence pour l'adaptation au changement climatique (TRACC), Ministère de la transition écologique et de la cohésion des territoires.
22. Impact du changement climatique sur l'assurance à l'horizon 2050, [Impact of Climate Change on Insurance by 2050] France Assureurs, 2021
23. La filière sport : les challenges d'une championne [The sports sector: the challenges of a champion], BPCE L'observatoire Economie du sport, 2023

# Main impacts on sport

## PRACTITIONERS

**Health and sports performance affected** by extreme temperatures, humidity levels and contact with synthetic materials during hot weather

**Increased risk of injuries** on hard pitches

**Safety of practitioners affected** by weather phenomena and water flows in watercourses

## SPECTATORS & OTHER AUDIENCES

**Health affected** by extreme temperatures and humidity levels

## SPORTS CALENDARS AND SEASONS

**Competition dates and sports seasons impacted** by extreme temperatures, drought and water availability, wildfire risk, snow cover, melting glaciers and weather events

## PRACTICE CONDITIONS

**Fewer opportunities to participate in sports** due to drought and water availability, reduced snow cover, heavy rainfall, wildfire risk and weather events

**Use of infrastructures and natural sites impacted** by extreme temperatures (potential conflicts of use)

## PITCHES & OTHER SURFACES

**Management and maintenance of playing surfaces affected** by extreme temperatures, humidity, drought and water availability, and new regulations

**Road sports impacted** by road surfaces heating up and degrading

## INFRASTRUCTURES & SPORTS SITES

**Buildings and other infrastructures affected** by extreme temperatures, drought and water availability, weather events, rising sea levels, disruptions to the freeze-thaw cycle, new regulations, changing cost of resources, etc.

## ECONOMIC MODELS

**Swimming pool filling impacted**

**Some competitions no longer held**, particularly high-altitude events

**Administrative closure of shelters or mountaineering areas**

**Inability to insure some events or infrastructures**

## JOBS

**Increased need for lifeguards**, including outside of summer months, due to extreme temperatures

**Careers of mountain personnel impacted** by extreme temperatures and snow cover levels

**The list of impacts per type of sports activity can be found in the appendix.**

PART 2

# PROPOSED ADAPTATION MEASURES FOR SPORT

It appears necessary, in view of the many effects of climate change, and in order to avoid maladaptation on one hand and broad, indiscriminate bans on the other, to develop adapted and targeted management methods based on individual sports activities, water resources, infrastructure types and specific territorial features. This approach will also mean that sports will not be hit by the adverse socio-economic impacts that comprehensive bans would cause, while also stimulating momentum for change.

Therefore, this section provides a set of **proposed adaptation measures for sport, to be collectively put in place by 2030 to pave the way for adapting sports activities to climate change, in accordance with the TRACC.**

Three priorities have been identified to help to ensure progress and deliver outcomes, starting with an overview of existing adaptation solutions, then the crucial question of the resources available for an operational plan, and finally, the desired outcome, i.e. a sports sector adapted in all its aspects to new climate conditions.

Each priority is then structured into objectives (9 in total) and into measures (30 in total).

The objectives should be viewed as steps toward progress, and not final targets.

To make it easier to read this report, the key responsible stakeholders are indicated for each measure outlined.

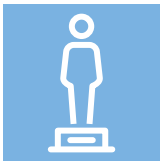
*< 6 months*

*Professional sport*

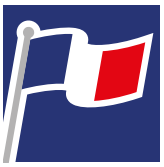
*Between 6 months and 2 years*

*Sports movement*

*Between 2 and 5 years*



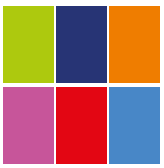
*Pay-to-play leisure sports*



*Government*

*Media*

*Local authorities*



*All stakeholders*

# PLAN STRUCTURE

## PRIORITY 1

### SHARED KNOWLEDGE OF THE CHALLENGES AND SOLUTIONS INVOLVED IN ADAPTING SPORT (TO CLIMATE CHANGE)

**Why?**

Objectively analyse dependence and impacts, and raise awareness of the challenges and solutions to make it possible to deliver adapted, targeted management

**How?**

**Objective 1.** Identify sport-related climate challenges and, in particular, sport's vulnerability to climate change

**Objective 2.** Supporting, raising awareness and training all sport sector stakeholders in how to take climate change challenges into account

**Objective 3.** Sharing and promoting feedback and adaptation solutions

## PRIORITY 2

### NEW WAYS OF ADAPTING SPORT (TO CLIMATE CHANGE)

**Why?**

Provide assistance in creating a new governance framework, and mobilise financial and human resources in order to create a sports policy adapted to citizens' concerns

**How?**

**Objective 4.** Promoting the development of a new governance framework that fully addresses the challenges of adaptation

**Objective 5.** Support innovation and make subsidies and sponsorship contracts conditional on environmental responsibility

**Objective 6.** Dedicate resources to sport adaptation policies

## PRIORITY 3

### DESIRED OUTCOME: ADAPTING ALL ASPECTS OF SPORT (TO CLIMATE CHANGE)

**Why?**

Use structural, organisational, technological and regulatory solutions to enable the entire sports sector to evolve in a consistent way

**How?**

**Objective 7.** Adapting sporting activities and competitions to climate conditions

**Objective 8.** Making sports venues simple, suitable and useful in terms of boosting urban resilience

**Objective 9.** Devising new socio-economic models

# SIX KEY MEASURES

Plan **climate change vulnerability studies** based on the TRACC in each sector of sport, in order to identify the climate conditions and minimum resources required for sports to be practised safely for each type of sports facility, venue and discipline

(measure 2)

**Method defined in late 2025**

Devise and implement a **joint awareness-raising and training programme** for sport decision-makers, on the challenges of adapting to climate change.

(measure 4)

**Training programme devised in late 2025, with 50% of decision-makers having received training in 2026 and 100% in 2030**

Monitor, as part of a joint oversight body, the **implementation and outcomes of the Sport PNACC**.

(measure 15)

**One event per year from 2025**

**Making government funding** via the ANS, for MISEs or by local authorities conditional on environmental responsibility by introducing (standardised) criteria for resilience to climate change and energy efficiency.

(measure 18)

**30% of subsidies with environmental conditions in 2025, 60% in 2027 and 100% in 2030**

Ensure that within each federation, **rules and recommendations for "adapted"** sports activity are adopted whenever the climate conditions and minimum resources required to safely practise the sport cannot be met.

(measure 22)

**in 20% of federations in 2025, 50% in 2027 and 100% in 2030**

Experiment with **solutions to help professions that are vulnerable** to climate change to evolve.

(measure 29)

**in 10% of federations in 2025, 40% in 2027 and 100% in 2030**

# PRIORITY 1

# Sharing knowledge of the challenges and solutions involved in adapting sport (to climate change)

> The first challenge is to objectively identify actual consumption and reliance on natural resources, the impacts and contributions of sports activities, and any existing management solutions.
>
> Then the second challenge is to bring these issues, data and solutions to the attention of all sport stakeholders, in order to share and expand knowledge and expertise over time as they develop.

# Objective 1: To identify climate challenges in relation to sport and, specifically, sport's vulnerability to climate change

**Why?** In order to adapt sports activities in an objective and targeted way, in alignment with the reality of sports environments and disciplines, it is necessary to identify and analyse which climate hazards affect which aspects of a sports discipline.
**How?** By developing a robust, shared knowledge base which makes it possible to manage and direct all sports-related policies in a way that takes into account the effects of weather and climate events, as well as each discipline's level of vulnerability to their consequences.

1. To task a working group from the National Observatory for Sport with defining how **the impacts of sport on the climate are measured**.

2. Plan **climate change vulnerability studies** based on the TRACC in each sector of sport[24], in order to identify the climate conditions and minimum resources required for sports to be practised safely for each type of sports facility, venue and discipline

3. Stepping up **the assessment and promotion of the benefits of sport**[25], so as to ensure it is given due consideration in future cross-sectoral trade-offs[26] which will be made inevitable by climate change.

**THIS ALREADY EXISTS!**

According to a 2022 France Stratégie report, the social cost of physical inactivity in France is 140 billion euros per year, which corresponds to over 38,000 deaths and 62,000 conditions caused by this each year.

**HOW?**

A methodological framework will be put forward by the MSJVA, acting as a guide for undertaking these studies for stakeholders involved in sport.

**THIS ALREADY EXISTS!**

There is work highlighting the following health risks based on external temperatures:

- between 32.2°C and 40.6°C: potential risk of cramps and exhaustion due to the heat;
- between 40.6°C and 54.4°C: higher risk of cramps and exhaustion due to the heat and higher risk of heat stroke;
- above 54.4°C: very high risk of heat stroke.

Temperature / humidity vigilance threshold indicators (above which sports must be adapted) already exist, such as those specified by World Rugby.

24. Here, "sector" refers to: the ways sport is practised, athletic performance, events, gyms, stadiums, equipment manufacturers, tourism operators, etc.
25. Benefits such as health-related sport, combatting physical inactivity, social cohesion, its role in protecting biodiversity, etc.
26. Trade-offs such as access to resources like water, energy, etc.

# Objective 2: Supporting, raising awareness and training all sport sector stakeholders in how to take climate change challenges into account31

**Why?** Adapting sport to climate change can only be achieved by mobilising all stakeholders including sports decision-makers, venue managers, coaches, participants, amateur or elite athletes and referees. These stakeholders can only be mobilised successfully if they are fully aware of these challenges and have received training on them.
**How?** By thoroughly informing and training sport decision-makers, venue managers, coaches, participants, amateur or elite athletes and referees on the correct practices to adopt. In addition, by encouraging and empowering sports personalities to play a key role in shaping the ideals of sports. Finally, by increasing awareness from a very early age, by introducing eco-athletes into sports clubs, for example.

**4.** Developing and implementing a **joint awareness-raising and training programme** for sport decision-makers on the challenges of adapting to climate change.

**HOW?**

This training programme will be designed in collaboration with the DITP and the MTEECPR, and its deployment will be overseen by the Sports Management School. It draws inspiration from the "Mon parcours transition écologique" programme created for senior government officials, which aims to make them aware of the impact of their actions, and to help them grasp the challenges of the green transition and adaptation so they can take action more effectively.

**5.** Adding modules covering adaptation to climate change[27] into all training and certification courses for **sports instructors**.

**6.** Training all **managers** of sports venues (such as sports infrastructure and natural areas) on the issues of mitigation and adaptation.

**7.** Supporting **athletes** in their role as ambassadors (or perhaps influencers) for new modes of behaviour[28], while helping to develop and professionalise their public-speaking skills, their actions to raise awareness with the general public, their advocacy efforts, how to use their image in media[29] and/or their choice of sponsors.

**THIS ALREADY EXISTS!**

In 2023, the French Athletics Federation gave its athletes a voice in a project called "Ralentir le rythme" ("Slowing the pace") and it has supported the "Sport Planète Athlé" programme since 2022 by funding 30 ambassadors.

**8.** Increasing **media** awareness of the issues of adaptation in sport, in order to spread information to the general public.

**THIS ALREADY EXISTS!**

In 2023, a "Sport planète" prize was awarded to Yann Hovine at the Micros d'Or ceremony organised by the French Sports Journalists Union and sponsored by the CNOSF.

**9.** Leveraging **behavioural science** in order to identify behaviours that need to be changed as a priority, analysing behaviours that could provide a potentially attractive[30] solution, then providing long-term support for these behavioural changes.

27. These modules may include integrating IPCC data into the work of sports instructors and educators, in order to make them aware of any specific issues at the venues where they are working, and their susceptibility to climate hazards. These modules must cover adaptation challenges for their disciplines, with, for example, a sub-module on the risks of accidents and illnesses associated with sports during high-risk periods. More broadly, the modules must cover the main tools for managing sports activities during crisis periods.

28. These new behaviours may involve using new destinations for training camps, reducing the number of competitions that participants can take part in over a season, donating their equipment in order to give it a second life, or incorporating more plant-based foods into their diets.

29. Athlete's images can be used in media in order to promote types of sport with a lower environmental cost.

30. "Potentially attractive solution" means, for example, the transformation of seasonal practice habits, the acceptability of one-off changes to game rules, using resources other than drinking water to clean sports equipment, etc.

# Objective 3: Sharing and promoting feedback and adaptation solutions

**Why?** Many stakeholders in sport are already measuring the impact and resource consumption of sports activities or facilities, as well as the effects of climate change on these activities. These parties are developing adaptation solutions that should be shared and promoted.
**How?** By promoting and sharing knowledge and feedback with all the relevant stakeholders (i.e. athletes, managers of sports venues and routes, and local authority and government representatives), including international bodies and via sports events. This kind of momentum should create a cycle of continuous improvement.

**10**. Every time stakeholders come together[31], **sessions should be organised for discussion and feedback** [32]on the adaptation of sports activities and infrastructure[33].

**11**. Encouraging **international sports bodies** to anticipate and incorporate ways of adapting sport to climate change into their strategies and plans[34].

**HOW?**

The methodological framework for undertaking climate change vulnerability studies in each sports sector in French (measure 2) will be translated into English to enable it to be used outside France.

**12**. Tracking **the findings of** relevant studies and resources, and sharing them with the stakeholders involved (such as participants, coaches and managers).

**THIS ALREADY EXISTS!**

The French Ministry of the Ecological Transition produces monitoring data on gardens, green spaces and infrastructure (JEVI), which is published in a monthly newsletter sent to the relevant stakeholders.

**13**. Using **sports events** to promote environmentally-friendly sports and their requirements in terms of adaptation, while also ensuring that poorly adapted solutions[35] are not promoted.

**THIS ALREADY EXISTS!**

In order to make television viewers aware of their rich natural heritage, the Tour de France, France Télévisions and the French National Museum of Natural History (MNHN) are teaming up for the Tour de France's Biodiversity Tour. At every stage of the race, a video lasting approximately 1 minute highlights the incredible natural heritage along the Grande Boucle route. These videos will be shown during live broadcasts of the competition, and are also available to watch on the MNHN website.

31. These include conferences, round table discussions, public consultations, trade fairs, sit-downs, etc.

32. They may take the form of case studies or "fresh eyes feedback" following study tours and peer exchanges involving visits to innovative facilities or environmentally friendly sports events, etc.

33. Please note that this measure addresses the recommendation made by the European Commission's Green Sport Expert Group, inviting Member States to promote best practices, innovative partnerships and cross-sector cooperation in the sports sector.

34. This might involve, for example, using and/or carrying out a climate change risk analysis for their sports disciplines across each climate region.

35. For example, not promoting the installation of air conditioning in a poorly insulated building.

PRIORITY 2

# New ways of adapting sport (to climate change)

A sports policy that does not include future climate change will very quickly become unsuited to citizens' priorities and concerns, so it is crucial that each sports policy be devised, revised, implemented and assessed with climate challenges in mind. This requires a new sports governance framework and financial and human resources capable of addressing these challenges.

However, it will take a long time to adapt and, despite the efforts already made, the sports sector is already suffering the increased economic impacts of climate change. Providing a compensation fund for all stakeholders in French sport will enable them to overcome the damage caused, while also coordinating the adaptation work required.

# Objective 4: Promoting the development of a new governance framework that fully addresses the challenges of adaptation

**Why?** In order to ensure that each sports policy is compatible with the realities of climate change that we are facing, the governance framework for sports must be suitably adapted, and incorporate climate challenges as a matter of priority.
**How?** By contributing to or creating spaces for international, national and local discussions and decision-making. A partnership made up of partner ministries, heads of sector networks and environmental scientists and experts will monitor the way in which this plan is implemented.

**14**. Helping to build **international momentum** around sport and climate[36].

**THIS ALREADY EXISTS!**

On the eve of the Paris 2024 Olympic Games, the President of the French Republic and the President of the IOC held the *Sport for sustainable development summit*, with the aim of instigating firm commitments around 5 themes consistent with the Paris 2024 milestones and the 17 SDGs, including sustainability.

**15**. As part of a partnership effort, **monitoring the implementation and outcomes of the PNACC sport**.

**16**. Incorporating or boosting the number of outdoor-sport participant representatives within **local consultation bodies**[37]**,** in order to promote their role as observers and protectors and, at the same time, boost their ability to provide local authorities with information about the climate hazards observed[38].

**THIS ALREADY EXISTS!**

Thanks to Suricate (Meerkat), people who participate in outdoor sports can act as lookouts. On the website or app, they can report a range of issues such as a signposting error, pollution, or a safety requirement, triggering a response from an administrator (such as a local authority, sports federation, natural site manager or decentralised Government department).

36. By contributing to initiatives such as the UN's Climate Action Programme, Football for Goals and the IOC.
37. Along with other environmental users (such as anglers, hunters, farmers and forestry workers).
38. For example, the network of weather stations.

# Objective 5: Supporting innovation and making subsidies and sponsorship contracts conditional on environmental responsibility

**Why?** New technological and/or organisational measures must be developed in order to address the various problems raised, while other solutions that are not suited to the future climate must be excluded.
**How?** By providing support for efforts to find and develop solutions that ensure that sports are adapted to climate change by prioritising long-term viable infrastructure projects, and harnessing soft power and the example set by sponsors and other funders of sport (such as sponsors, federations and local authorities).

**17**. Including a "climate change adaptation" proviso in sports **innovation support** programmes (such as the ANS) and including a "sport" proviso in programmes to support innovation in ecological transition (such as future investment programmes, the BPI public investment bank and France 2030).

**18**. Making **government funding via the ANS**[39]**, for MISEs or by local authorities** conditional on environmental responsibility by introducing (standardised) criteria for resilience to climate change and energy efficiency[40].

**THIS ALREADY EXISTS!**

Since 2022, any State-funded subsidies for major international sporting events are subject to the signing of a charter of 15 eco-responsibility commitments by event organisers.

**19**. Encouraging **the funders of sport** to allocate some of their support to adapting sports activity to climate change.

**HOW?**

Within the *"Filière sport"*, where one of the areas of focus on the 2024-2026 road map is developing sustainable sports, a working group dedicated to environmentally responsible sponsorship will be set up in order to establish the main procedures for sponsor support vis-a-vis adaptation (e.g. research funding).

39. For example, the "5,000 terrains de sport [5000 Sports Grounds] - Génération 2024" plan.

40. It should be noted that the European Commission's Green Sport Expert Group recommends making public funding for sports federation contingent on the achievement of environmental objectives. These environmental pre-conditions will only be successful if they are coupled with a policy of training and supporting stakeholders, in order to ensure they can rise to the challenge.

# Objective 6: Dedicate resources to sport adaptation policies

**Why?** Devising, implementing and assessing adaptation measures requires increased human and financial resources.
**How?** By empowering and supporting key stakeholders to enable them to fulfil their climate-change adaptation roles. These include Ministry of Sport departments, its staff, resource centres and decentralised departments, as well as sports federations, funders of sports and other institutions (such as the French Ministry of the Ecological Transition, Energy, Climate and Risk Prevention; the French Ministry for National Education; the French Ministry for Higher Education and Research; and the French Ministry of the Interior).

**20**. Nominating pairs of "**sustainable development and/or environment advisers**" (a decision-maker and a technical adviser) in various sport structures, boosting their resources, raising their profiles and continuing to build their skills around climate issues[41].

**THIS ALREADY EXISTS!**

To date, 77 federations have named at least one expert adviser. According to a survey conducted at the end of 2023, to which over half of the network responded, there is a high level of churn in this network with almost half (40%) having held their position for less than a year, and just 20% having held their position for over 3 years. This network is very varied: one third of advisers focus their work fully on sustainable development, one third between 25% and 100%, and one third less than 25% in addition to their other tasks, specifically in relation to assisting clubs with their regional development.

**21**. Expanding the range of tasks assigned to the **national outdoor sports resources centre** to cover the ecological transition, with a view to providing support to stakeholders in sport, particularly when seeking funding.

41. The sport structures in question include sports federations, professional leagues, organisers of sports events, sports facility managers and even institutions of the Ministry of Sport. For federations, these advisers must be nominated as a priority from among the senior civil servants made available to them, who will be given a mission statement to this end. This measure is based on the recommendations of the European Commission's green sport experts, who encourage the nomination of advisers from within different organisations and regions (such as regional associations, clubs, professional unions, federations and networks of outdoor sports advisers). These advisers are then tasked with gathering and disseminating information about sports and environment challenges, and contributing to discussion sessions.

# PRIORITY 3

## Desired outcome: adapting all aspects of sport (to climate change)

Sport will be adapted to the effects of climate change via a set of structural, organisational, technological and regulatory solutions. They will cover both the way in which sports are played and how events are organised, as well as the management of sports sites and economic models.

It is not possible to bring about an underlying cultural shift in behaviour and allegiances without a strong change management policy to support all the stakeholders in the sector.

# Objective 7: Adapting sporting activities and competitions to climate conditions

**Why?** New ways of participating in sport are required in order to ensure, firstly, that physical and sporting activities can continue despite climate risks, and secondly that there is sufficient public awareness of the adaptation required. Sports competitions are organised using resources which, depending on the date, time and location of the event, may be affected by climate change.
**How?** By inventing, devising and developing alternative sports activities that are less vulnerable to the hazards of climate change, and, based on cost-benefit analyses, making changes to the key parameters of sports competitions (timing, location, etc.) to ensure that they can carry on and that they are compatible with climate challenges.

**22.** Ensure that within each federation, rules and recommendations **for "adapted" sports activity** are adopted whenever the climate conditions and minimum resources required to safely practise the sport cannot be met[42].

### THIS ALREADY EXISTS!

- Touch rugby when the pitch is not springy enough
- Roller skiing, ski jumps on synthetic surfaces or ice climbing on wood due to a lack of snow / ice
- Environmental awareness sessions for sailing on days when there is no wind

**23.** Reorganising **sports calendars and seasons** while taking into account the economic, social and environmental risks and consequences caused by the impacts of climate change[43].

### THEY'VE DONE IT!

At the 2023 Courchevel World Ski Championships, around one hundred international skiers delivered an open letter to the International Ski Federation calling on it to transparently step up its environmental actions, and asking it to adjust the competition calendar in particular, with a significant reduction in international travel and a delay to the start of competitions, in order to avoid cancellations, a lack of snow and competitions scheduled in the autumn.

**24.** Promoting moderation vis-a-vis **the formats and sizes of sports events,** taking climate hazards into account[44].

### THIS ALREADY EXISTS!

The organiser of the Transjurassienne annual cross-country ski race plans to change its race route (76 km) to a loop so that it does not have to use huge amounts of artificial snow.

During the Paris 2024 Olympic Games, events taking place at the Grand Palais were scheduled early in the morning or late in the evening in order to reduce the greenhouse effect of the large glass roof.

42. For example, by setting rules to reduce collisions and falls on the turf where pitches are not springy enough, by changing the times of sports activities, organising sports sessions in cooler locations, and doing low-intensity sport when temperatures are very high.

43. For example, this could involve reducing the number of events or fixtures to give the environment/pitch the opportunity to recover, optimising the pool system in team sports to reduce the number of championships, and maximising the number of matches for each event.

44. For example, by adapting the choice of venues for major events, by adapting the forward planning for the number of spectators on the basis of climate conditions, and by having plans in place to postpone or even cancel events.

# Objective 8: Making sports venues low-consumption, suitable and useful in terms of boosting urban resilience

**Why?** Sports facilities and natural areas for sports are already suffering from the effects of climate change, and there are no guarantees as to whether they will be compatible with the climate in the future unless efforts are made to adapt. These efforts will also enable the infrastructure and venues to make a contribution to urban resilience, for example by becoming cool islands incorporating facilities for generating renewable energy and recovering rainwater.
**How?** By emphasising, in tandem with implementing strategies for energy moderation in sport, the need for stringent requirements for managing energy and water consumption in programmes to build, renovate and modernise sports facilities, and by adopting and implementing protection measures for natural areas, in order to ensure that these natural environments can continue to adapt. Concerted regional management of sports sites will be key to achieving these objectives.

**25**. Within the technical specifications of plans for the construction and renovation of infrastructures, strengthening **the environmental requirements**[45] **and the minimum requirements for climate change resilience** in sports facilities.

**THIS ALREADY EXISTS!**

The curved shape of the roof of the Olympic Aquatics Centre in Seine Saint Denis means that the volume of space that needs to be heated up is reduced and, with its surface area of 5,000 $m^2$, its solar panels make it self-sufficient in energy.

**26**. Reviewing the **specifications of international and national federations and professional leagues** to reduce their consumption of equipment, make them more resilient, promote the adaptation of sports to climate hazards, and make them more responsive to climate hazards.

**HOW?**

For example, by amending the official sports times, runs (such as loops and shaded areas, etc.), ways of drawing up groups of athletes, or ways of assessing performance (for example, adjusting the result based on an indicator reflecting one or more aspects of the sporting conditions such as wind, temperature, snow thickness, etc.).

**27**. Ensuring a suitable balance between the practice of outdoor sports and the protection of natural environments, by putting in place **management tools to help prevent sports sites from becoming overused**, and by supporting and overseeing the development of new natural sports sites[46].

**HOW?**

Using timetables for exceptionally busy periods, directing participants / users to less busy sites, improvements to encourage positive behaviours, establishing time slots that alternate between sports activity periods and quiet periods, and even implementing quotas (for example, the Calanques in Marseille).

**28**. Referring to analyses of climate impacts on the local region, during **discussions prior to decisions** regarding the location, renovation, management and maintenance of each sports facility, area and route[47].

45. For example, this would involve irrigation, heating temperature, air conditioning, lighting etc. This means, among other things, incorporating the Association Française de Normalisation's (AFNOR) energy conservation standards in the Unified Technical Documents (Documents Techniques Unifiés - DTU) and emphasising the concept of summer comfort / summer liveability. This review of the specifications' environmental requirements presupposes training for local urban planning departments and private operators, as well as preliminary work with builders.

46. For example, high-altitude sites or new rivers or lakes, once glaciers have melted.

47. In these discussions, the responsibilities of each individual must be collectively defined for these facilities to justify setting them up, while also taking into account any opportunities for shared usage and ensuring the facility's adaptability to climate changes, including the potential for building reversibility.

# Objective 9: Devising new socio-economic models

**Why?** Sports coaches are already affected by climate change in the course of their work (i.e. inaccessible sports sites, extremely high temperatures and unsuitable sports conditions), while other sports stakeholders are more and more regularly facing issues with insurance for their sport due to climate change.
**How?** By supporting all stakeholders in taking these climate changes into account in their sport, by establishing cost estimates for adaptation and identifying potential funding sources, while ensuring that no models that emit more $CO_2$ than current models go forward.

**29**. Experimenting with solutions to help **professions that are vulnerable** to climate change evolve.

**HOW?**

Following up on the "Grenelle des métiers du sport" (a roundtable event on sport sector careers), bridges between qualifications to enable coaches to become more versatile, and the development of multi-activity models, will be tested in 2025-2026 with outdoor sports federations.

**30**. Testing and implementing **smart solutions to create diversity in the range of sports activities available** where the main activity becomes impossible due to the effects of climate hazards.[48]

**HOW?**

In the future, the following may be envisaged:

- setting up partnerships between federations in order to make it possible to subscribe to a multi-sports licence,
- creating pooling and cooperative systems which will help to mitigate the effects of climate hazards on a number of disciplines (multi-sports bases with independent guides enabling the different activities to offset and counterbalance each other).

48. The differing responses and capabilities of various stakeholders (for example, a facility manager / operator operating under a public service delegation or a concession, and a private company operating as a provider of pay-to-play leisure sports) need to be taken into account.

# APPENDICES

# GLOSSARY

**Acceptability**: quality of something which is more or less tolerable, which can be accepted, received, tolerated or even admitted.

**Adaptation**: reducing vulnerability to current and future climate change, and benefitting from any potential opportunities that it creates.

**Climate hazard**: extreme climate trend or event which is likely occur with a greater or lesser probability with the potential of causing damage to populations, businesses and environments. Hazards are defined by their nature, location, frequency and severity.

**Climate risk analysis**: A cross-study of how likely it is that a climate hazard will occur, and the physical impact of this hazard on a specific aspect.

**Mitigation**: limiting the scale of man-made climate change by reducing greenhouse gas emissions.

**Appeal**: quality of something that is attractive, which is appealing due to its benefits and its characteristics.

**Biodiversity**: refers to all living beings, the ecosystems in which they live and the interactions between species and between them and their environments.

**Heatwave**: a long period of severe heat where temperatures reach or exceed regional or local thresholds, constituting a health risk for the entire population exposed to it.

**Extreme heatwave**: exceptionally long-lasting, severe heatwave covering a wide area that severely affects the health of the entire population or may cause collateral damage, particularly in terms of business continuity.

**Climate change**: change in the climate which can be attributed to natural or human factors. Current climate change is mainly due to the development of human industry since the mid 19$^{th}$ century.

**Climate**: description of the averages and the variations in meteorological parameters (such as temperature, level of precipitation and wind). This can be used to describe the status of the climate over a given period (usually between 20 and 30 years).

**Thermal comfort**: feeling of wellbeing in an indoor environment. There are six criteria that play a role in this thermal equilibrium: metabolism (heat produced by each person, which varies based on their age, health, activity and psychological condition), clothing, the environment (temperature of opaque and glass walls or radiant temperature), direct sunlight, the ambient temperature of the air and its humidity levels, and airspeed.

**Rise in water levels**: rise in the level of a watercourse, due to melting snow or ice, or heavy rainfall.

**Tropical cyclone**: large area of rotating storm clouds with strong winds which form over tropical or subtropical waters.

**Sports discipline**: aspect of a sport involving one or more events.

**Snow cover**: condition of a site covered with snow; thickness of the snowpack.

**Sports facility**: any property belong to a public body that has been specially equipped or used on a permanent or temporary basis for the purposes of a sports activity, and which is open to participants either free of charge or for a fee.

**Extreme weather events**: events that may last for a number of weeks or months (such as droughts), or which may occur over a very short period of time but are extremely severe (such as cyclones).

**Coastal erosion**: gradual loss of sediment along the coastline.

**Training (as opposed to awareness-raising)**: the process of providing stakeholders with new and appraisable skills and abilities.

**Extreme heat**: temperatures which may pose a health risk to the population.

**Landslide**: downward movement of rocks, debris or earth on a slope, caused by gravity.

**Cooling spots**: locations made available where the general public can stop and/or rest that provide a cooler environment compared to their surroundings during hot periods or heatwaves.

**(Urban) heat islands**: urban areas with higher recorded temperatures, particularly in terms of maximum daytime and night-time temperatures, compared to neighbouring rural or forested areas or to average regional temperatures.

**Wildfire**: uncontrolled fire, both in terms of time and area. Characteristically, it can spread rapidly and cause major damage.

**Flooding**: submersion, both quickly and slowly, of an area that is usually above the water.

**Pay-to-play leisure sports**: range of paid leisure sports, not linked to a sports federation.

**Maladaptation**: refers to a process of adaptation which results directly in increased vulnerability to climate change and/or where current and future adaptability is impaired.

**Sports movement**: all national or international bodies (such as regional and local governments, federations, associations and clubs) that play a role in the practice, development and organisation of sports.

**Tropical nights**: nights when the temperature does not fall below 20°C.

**Permafrost**: geological term referring to any ground surface which has a temperature of below 0°C for more than two consecutive years.

**Heat spikes**: short-term exposure (1 to 2 days) to severe heat that poses a risk to human health for vulnerable people or those with high exposure to this heat due to their working conditions or physical activity.

**Pollution spike(/episode)**: occurs when the information and recommendation threshold or the alert threshold set by national law is exceeded, or may be exceeded, for the following four air pollutants: particles with a diameter of less than 10 micrometres (PM10), ozone (O3), nitrogen dioxide (NO2) and sulphur dioxide (SO2).

**Extreme rainfall**: this is characterised by heavy rainfall over a short period (ranging from 1 hour to a day).

**Precipitation**: water falling to the ground in liquid (rain) or solid (snow or hail) form caused directly or indirectly by the condensation of atmospheric water vapour.

**Prevention**: measures taken in order to prevent any damaging situation from arising or deteriorating.

**Global warming**: manifestation of climate change characterised by a rise in average temperatures on the Earth's surface.

**Retraction / expansion of clay soils**: mechanism whereby a clay soil changes volume and consistency based on its water content. When wet, it expands. When dry, it retracts.

**Resilience**: the ability to withstand or overcome a climate crisis by responding or reorganising in such a way as to retain the ability to adapt, learn and transform.

**Risk**: the result of a triggering climate event and a situation in which people and property are vulnerable and exposed. The risk is based on the likelihood of the event occurring and the severity of the impact.

**Salinisation (pitches)**: accumulation of water-soluble salts in soils at levels that are toxic for the majority of plants, animals and fungi.

**Behavioural sciences**: a set of disciplines which investigate activities and interactions between living organisms.

**Drought**: a sustained period of water shortage resulting in a rage of impacts on the soil, vegetation and aquifers (underground bodies of water) in particular. There are three main types of drought:

- Meteorological drought: this is caused by a lack of rainfall; when the amount of water is clearly lower than normal seasonal levels over an extended period.
- Soil drought (also known as "agricultural drought"): this is caused by water shortages in the soil, and adversely affects vegetation growth; despite its name, this does not only affect farm land, but also all soil and plants.
- Hydrological drought: this occurs when groundwater, water bodies and lake reserves fall below average levels. This kind of drought may be due to a lack of rainfall, but also due to significant evaporation caused by high temperatures. Drought may also be exacerbated by intensive or inappropriate use of the water available, or by soil misuse.

**Awareness-raising (as opposed to training)**: a process that makes stakeholders more receptive by providing them with knowledge.

**Energy (/water) moderation**: deliberate coordinated reduction of energy (/water) consumption. Beyond reduction, the focus is on usage and implies an individual or collective change in behaviour.

**Sponsorship**: financial or physical support provided for an event, to an individual or an organisation, by an advertising partner in exchange for different kinds of visibility.

**Sport**: activity which predominantly involves physical effort, skill and/or hand-eye coordination with competitive elements, where the rules and behavioural ideals governing the activity are officially defined by organisations, and can be practised individually or as part of a team.

**Coastal flooding**: rapid, short-term flooding (ranging from a number hours to a number of days) of usually dry land in coastal areas by the sea during bad weather and poor sea conditions.

**Average temperatures**: average temperature calculated across the surface of the Earth (oceans and continents) across an entire year. The average temperature is provided to the nearest tenth of a degree.

**Storm**: refers to both a large area of high winds (if the wind hits 100 km/h on land and 120 km/h (or 130 km/h) on the coast) and the low pressure that causes them.

**Thermal (wind)**: difference in the wind at two different heights in the atmosphere, due to the temperatures of the two air masses.

**Shoreline**: this is the place where the land and the sea meet at high tide (with a coefficient of 120) under normal weather conditions.

**Global warming trajectory**: projection of the future climate used by the French Ministry of the Ecological Transition and Territorial Cohesion, based on the trend scenario according to the IPCC, in order to align France's climate change adaptation measures.

**Ecological transition**: progress towards a new economic and social model, a sustainable development model which changes the way in which we consume and produce, work and live together, in order to address major challenges of environmental and climate change, resource scarcity, the accelerated loss of biodiversity and the increase in the number of environmental health risks.

**Heatwaves**: periods when temperatures may pose a health risk to the population.

**Vulnerability**: the extent to which an aspect or a system is adversely affected by climate change. The level of vulnerability depends on the sensitivity of the system or the aspect being studied, as well as its adaptability.

# LIST OF ACRONYMS

**ADEME**: French Environment and Energy Management Agency (now the French Ecological Transition Agency)
**ANS**: French National Agency for Sport
**IOC**: International Olympic Committee
**CNOSF**: French National Olympic and Sports Committee
**DITP**: French Inter-ministerial Directorate for Public Transformation
**MISE**: Major international sports event
**IPCC**: Intergovernmental Panel on Climate Change
**MSJVA**: French Ministry of Sport, Youth Affairs and Community Associations
**MTEECPR**: French Ministry of the Ecological Transition, Energy, Climate and Risk Prevention
**SDG**: Sustainable development goals
**UN**: United Nations
**PNACC**: National Climate Change Adaptation Plan
**TRACC**: France's national baseline global warming trajectory for climate adaptation

# NOTE ON THE METHODOLOGY

The aim of the Sport PNACC is to define the framework measures that need to be in place in mainland France by 2030, in order to anticipate the adaptations required for sports activities to meet climate change.

The Sport PNACC covers all amateur and professional sports represented by national federations. The effects of climate change on all aspects of sporting activities (such as disciplines, venues and infrastructure, and events) are explored.

The adaptation measures are aligned with the cross-sector National Climate Change Adaptation Plan (PNACC); on one hand they pertain to the physical effects of climate change, and on the other they take into account certain indirect effects such as the way in which the discipline is perceived (acceptability) or specific health, regulatory, economic and organisational risks. However, the geopolitical, social and macro-economic repercussions of climate change are not explored.

**There were five key stages involved in drawing up the Sport PNACC:**

1. Based on a series of expert interviews, identifying the challenges for each discipline and sports venue, in order to set up groups of disciplines to which similar adaptation measures might be applied;
2. Creating an overview of the effects of climate change on all sports activities, via 12 workshops with representatives from various disciplines grouped together based on the challenges identified in the previous step;
3. Public consultation in order to ensure wide circulation of the overview of the effects of climate change on sports activities, gathering as many proposals for adaptation measures as possible and facilitating the adoption of the Sport PNACC;
4. Identifying and prioritising adaptation measures for each group of disciplines, over the course of 5 workshops bringing together representatives of the various disciplines;
5. Formalising the plan.

## Step 1: Identifying the challenges for each discipline and type of sports venue, in order to set up groups of disciplines to which similar adaptation measures might be applied

The aim of the Sport PNACC is to define the framework measures for climate change adaptation across all sports activities in mainland France. In order to formulate the appropriate recommendations for each sport, the major climate change challenges for each discipline (such as the risk of damage to sports sites or these sites becoming less accessible, or the threat of impaired sporting performance) were identified in order to group together sports facing the same challenges, and so apply similar adaptation measures to them.

The sports were therefore grouped together as follows:

- Sports practised in open stadiums and in urban facilities, further sub-grouped into: stadiums with grass pitches, open stadiums, outdoor pitches and urban sports facilities, and motorsports;
- Indoor sports activities, distinguishing between: indoor sports, pool-based sports and sports on ice;
- Sports activities in natural aquatic environments, distinguishing between: whitewater sports, water sports (in inland bodies of water, in the sea or along the coastline) and underwater sports;
- Outdoor sports activities on land and in the air, distinguishing between: sports in lowlands and mid-mountain ranges, high-altitude sports, equestrian sports and aerial sports.

## OPEN STADIUMS & URBAN ENVIRONMENTS

| Stadiums with (synthetic or natural) grass pitches | Open stadiums, outdoor pitches & urban sports environments | Motorsports |
|---|---|---|
| Baseball and softball, Football, Golf, Hockey, Rugby, American football and Horseracing | Athletics, Basketball, Pentathlon, Tennis, Shooting, Archery, Triathlon, Volleyball, Clay pigeon shooting, Pelota, *Pétanque* and *jeu provençal* (bowls), *Boules* (bowls), BMX, Rollerblading, Skateboarding, Parkour and Road racing | Motorcycle and car racing |

## INDOOR

| Indoor sports | Pool sports | Sports on ice |
|---|---|---|
| Badminton, Basketball, Boxing, Track cycling, Fencing, Football and Gymnastics, Weight training/weight lifting, Handball, Judo, Jujitsu, Kendo and related disciplines, Karate and related disciplines, Wrestling, Climbing, Taekwondo and related disciplines, Tennis, Table tennis, Aikido and Budo, Martial arts and Pool, Bowling, Dancing, Chess, Kickboxing, Muay Thai and related disciplines, Savate, French boxing and related disciplines, Boules (bowls), Squash, Baton twirling, Power Sports, | Swimming, Underwater sports, Triathlon | Ice hockey, Ice sports |

## NATURAL AQUATIC ENVIRONMENTS

| Whitewater sports | Water sports | Underwater sports |
|---|---|---|
| Canoeing, Kayaking, Other paddle sports, Sport angling, Hydrospeed, Rafting, Canyoning | Rowing, Sport angling, Water jousting and Lifesaving, Triathlon, Water skiing and Wakeboarding, Lifesaving and Lifeguarding, Open-water swimming, Water skiing and Wakeboarding, Lifesaving and Lifeguarding, Surfing, Bodyboarding, Sailing, Team beach sports, Beach tennis, Land sailing Triathlon, Powerboat racing, Water jousting and water rescue | Free-dive sports fishing, Underwater sports |

## NATURAL LAND AND AIR ENVIRONMENTS

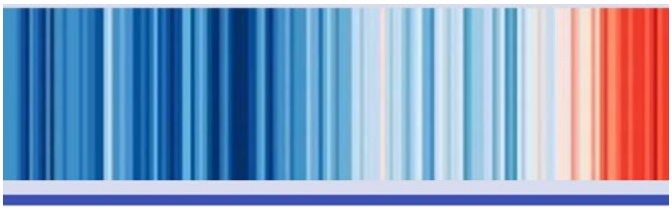
| Other outdoor sports | High-altitude and Alpine sports | Aerial sports | Equestrian sports |
|---|---|---|---|
| Mountain biking / Cyclocross, Road cycling, Climbing, Bicycle tourism, Hiking, Triathlon, Orienteering, Motorcycling, Caving and Trail running | Mountaineering, Ice climbing, Skiing, Snowboarding, Pulk sledding or dog sledding, trail skiing | Free flying, glider flying, Motorised ultra-light flying and Model aircraft flying, Aeronautics, Ballooning, Parachuting | Polo, Horse riding |

## Step 2: Overview of the effects of climate change on sport

The overview of the effects of climate change on sports aims to document the main challenges relating to climate change for different disciplines. It is based:

- Primarily on:
  - Firstly, the variations in climate data (such as temperature and rainfall) of the national baseline global warming trajectory for climate adaptation (TRACC): **+1.5°C by 2030, +2°C by 2050 and +3°C by 2100 globally, causing temperatures in mainland France to increase by around +2°C by 2030, +2.7°C by 2050 and +4°C by 2100 compared to pre-industrial levels.**. The trends identified mainly come from the TRACC or the Explore 2070 project.
  - Secondly, the anticipation of specific indirect effects of climate change in terms of regulatory, economic (cost, etc.) and behavioural changes (acceptability, etc.). These changes are not quantified here because there are no projections available for them, but they must not be disregarded as they may affect specific aspects of sporting disciplines and the evolution of climate hazards.
- Then, the overview is based on identifying the impacts of each variation in climate hazards (caused by climate change) and identifying each indirect effect of climate change on the different aspects of each given group of disciplines. This step was performed over the course of 12 workshops with key stakeholders from the world of sport (such as representatives from federations and training centres, elected officials responsible for infrastructure and socio-professional representatives). These discussions made it possible to define the climate hazards (such as temperature, heatwaves, drought etc.) to be taken into consideration for each group of disciplines, and their specific impacts on the disciplines. They also made it possible to highlight specific environmental incompatibilities (hard limits) and to make an initial assessment of the sensitivity level and the adaptability of each of the activities.

## Step 3: Public consultation



**Consultation publique à l'appui de l'élaboration du Plan National d'Adaptation au Changement Climatique du Sport.**

La France et certaines de nos activités sportives sont déjà, et continueront d'être, impactées par les conséquences directes et /ou indirectes du changement climatique.

Dans ce contexte, le Ministère des Sports et des Jeux Olympiques et Paralympiques (MSJOP) se dote d'un Plan National d'Adaptation au Changement Climatique pour le Sport à horizon 2030 (PNACC Sport 2030). Il rassemblera les principales mesures d'adaptation de la pratique sportive (amateure ou professionnelle, libre ou encadrée, au quotidien ou lors d'évènements) à mettre en place d'ici 2030, pour permettre une adaptation aux conséquences actuelles et à venir d'un scénario de réchauffement mondial moyen de +2°C en France Métropolitaine.

En complément d'une recherche bibliographique et de plusieurs ateliers de concertation, le MSJOP lance cette **consultation publique qui vous permet de partager vos propositions de mesures et actions d'adaptation à une ou plusieurs conséquences du changement climatique, en fonction des typologies de pratiques sportives.**

Attention, les mesures retenues seront des mesures d'adaptation de la pratique sportive au changement climatique et non des mesures d'atténuation (réduction de l'impact) du sport sur le climat. Elles devront néanmoins permettre de poursuivre les efforts de réduction de l'impact des pratiques sportives sur le climat.

Nous vous remercions par avance pour vos contributions, **d'ici le 4 juin 2023.**

Vous pouvez également partager des documents et ressources vie la mail docpnaccs@gmail.com.

An online public consultation was held from 05/05/2023 to 04/06/2023 to circulate the overview of the effects of climate change on sports to the entire sector, to mobilise as many people involved in sport as possible, and to lay the groundwork for the adoption of the Sport PNACC.
This consultation gave each participant the opportunity to peruse the overview and provide up to five recommendations for adaptation measures for each group of disciplines.
A total of 252 recommendations (from 146 contributors) were gathered via this online consultation. After the consultation, work to formalise the recommendations for adaptation measures into objectives was undertaken in committee.

## Step 4: Identifying and prioritising the measures

The adaptation measure recommendations which appear in this Sport PNACC were developed through a collaborative effort with a select number of sport experts (representatives from federations, clubs, nature areas and participants) over five themed meetings:

- Sports activities in open stadiums and urban environments,
- Indoor sporting activities, sports activities in swimming pools and sports activities on ice,
- Water and underwater sports activities in natural aquatic environments,
- Outdoor sports activities on land (excluding winter and high-altitude sports) and aerial sports,
- Winter sports and high-altitude sports.

These workshops set out to prioritise the objectives based on the major challenges for each group of disciplines, and to identify the obstacles and opportunities for implementing the measures operationally. The workshops were structured as follows:

- Presentation of the six formalised strategic priorities and all the measures identified;
- Discussions between information contributors on the overall suitability of the objectives, and to identify potential obstacles or inconsistent objectives;
- For each aspect of the disciplines (i.e., participants and spectators / sports environments and infrastructures / formats and versions of the discipline, etc.), three strategic models were selected, measures were reworked, the individual responsible for the measure was identified and the obstacles and opportunities were fine-tuned.

## Step 5: Formalising the plan

Following the two rounds of collaboration workshops, work was undertaken to characterise and reprioritise the measures based on the feedback provided. To be exact, 9 objectives (broken down into 30 measures) were grouped together into three strategic priorities.

# THE IMPACTS OF CLIMATE CHANGE ON SPORT

On indoor pitches

On outdoor pitches and in urban environments

On grass pitches

Outdoors, on land

High altitude

Water sports in inland and coastal water bodies

In whitewater

Underwater

In swimming pools

On ice

Equestrian

Aerial

# Sports on indoor pitches

## Participants and coaches

- Health of the participants and sports performances impacted by extreme temperatures, heatwaves, and rising humidity levels
- Health of the participants impacted by contact with synthetic materials during periods of extreme temperatures

## Spectators and other groups

- Health of the spectators, staff members, service providers and others impacted by extreme temperatures, heatwaves and rising humidity levels

## Infrastructures

- Buildings and other sports infrastructures impacted by extreme temperatures, heatwaves, droughts and availability of water resources, weather events, rising water levels and floods, retraction / expansion of clay soils, etc.
- Thermal comfort inside infrastructures impacted by extreme temperatures and mounting energy costs
- Risk of sports facilities contributing to or becoming heat islands
- Closure of obsolete structures or structures which no longer meet standards as a result of changes made to building environmental requirements
- **Opportunity for sport to make a contribution to urban resilience: sports infrastructures provide, or could provide, very green areas which would help to cool cities and towns.**

## Sports venues and conditions

- Impact on how heavily sports sites are used, based on their "thermal comfort" (some venues and infrastructures deserted or overused)

## The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

## Economic models

- Economic model impacted by increased costs of insurance, materials etc..

## Discipline formats and variations

- Sports calendars / seasons impacted by rising average temperatures
- Discipline impacted by regulatory changes caused by climate change

# Sports
# on outdoor pitches and in urban environments

## Participants and coaches

- Health of the participants and sports performances impacted by extreme temperatures, heatwaves, and rising humidity levels
- Health of the participants impacted by exposure to pollution: increased pollution spikes and contact with synthetic materials during periods of extreme temperatures

## Spectators and other groups

- Health of the spectators, staff members, service providers and others impacted by extreme temperatures, heatwaves and rising humidity levels

## Infrastructures

- Sports infrastructure impacted by weather events, rising water levels, floods and retraction / expansion of clay soils
- Impact on how heavily sports sites are used based on their "thermal comfort" (some sites deserted or overused, notably shaded areas).

## Sports venues and conditions

- Impact on how heavily sports sites are used based on their "thermal comfort" (some sites deserted or overused, notably shaded areas).

## Surfaces and urban sports sites

- Management and maintenance of surfaces impacted by a range of hazards such as extreme temperatures, heatwaves, droughts and the availability of water resources, and flooding
- Risk of sports facilities contributing to or becoming heat islands
- **Opportunity for sport to make a contribution to urban resilience: sports grounds and infrastructures provide, or could provide, very green areas which would help to cool cities and towns.**

## The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

## Economic models

- Economic model impacted by increased costs of insurance, materials etc..

## Discipline formats and variations

- Sports calendars / seasons impacted by rising average temperatures
- Organisation of sports events and their broadcasts impacted by uncertain weather patterns and weather events
- Discipline impacted by regulatory changes caused by climate change

# Sports practised on grass pitches

## Participants and coaches

- Health of the participants and sports performances impacted by extreme temperatures, heatwaves, and rising humidity levels
- Increased risk of injuries on dry surfaces
- Health affected by exposure to pollution: increased pollution spikes with higher temperatures and contact with synthetic materials during periods of very hot weather

## Spectators and other groups

- Health of the spectators, staff members, service providers and others impacted by extreme temperatures, heatwaves and rising humidity levels

## Infrastructures

- Buildings and sports infrastructure impacted by weather events, rising water levels, floods and retraction / expansion of clay soils
- Risk of sports facilities contributing to or becoming heat islands
- **Opportunity for sport to make a contribution to urban resilience: sports grounds and infrastructures provide, or could provide, very green areas which would help to cool cities and towns.**

## Sports pitches and green spaces

- Management and maintenance of natural and synthetic pitches impacted by a set of hazards and indirect effects, such as extreme temperatures, heatwaves, drought, availability of water resources; increased costs, and new (national and European) regulations
- Sports grounds (particularly golf courses) affected by rising water levels (submersion and salinisation of grass)
- Development of diseases in grass due to high temperatures and high levels of humidity
- **Opportunity for sport to make a contribution to urban resilience: sports grounds and infrastructures provide, or could provide, very green areas which would help to cool cities and towns.**

## The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

## Economic models

- Economic model impacted by increased costs of insurance, materials etc..

## Discipline formats and variations

- Sports calendars / seasons impacted by rising average temperatures
- Organisation of sports events and their broadcasts impacted by uncertain weather patterns and weather events
- Discipline impacted by regulatory changes caused by climate change

# Outdoor sports activities on land
## (excluding high-altitude and Alpine sports)

### Participants and coaches

- Health of the participants and sports performances impacted by extreme temperatures, heatwaves, and rising humidity levels
- Participants concentrated on sites that can provide "thermal comfort" (shaded sites or sites at altitude), resulting in potential conflicts of use.

### Infrastructures

- Buildings and sports infrastructure impacted by weather events, rising water levels, floods and retraction / expansion of clay soils
- Thermal comfort inside infrastructures impacted by extreme temperatures and mounting energy costs

### Sports venues and conditions

- Road sports impacted by road surfaces heating up and degrading
- Sites impacted by cliff collapses due to fluctuations in temperature, rising water levels and landslides due to heavy rainfall
- Access to sports sites impacted by heightened wildfire risks (in terms of frequency, length of time and areas affected)
- Access to sites which are regulated for environmental protection reasons
- Safety of sport impacted by increasingly frequent, severe and sudden-onset extreme weather events
- Management and preparation of sports sites impacted by reduction in water resources
- Inability to wash down equipment (maintenance) during periods when water access is restricted

### The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

### Economic models

- Economic model impacted by increased costs of insurance, materials etc..

### Discipline formats and variations

- Sports calendars / seasons impacted by rising average temperatures
- Organisation of sports events and their broadcasts impacted by uncertain weather patterns and weather events

# Outdoor sports activities on land

## Focus on high-altitude and Alpine sports

### Participants and coaches

- Health of the participants and sports performances impacted by extreme temperatures and heatwaves and by rising humidity levels
- Safety impacted by the risk of landslides and unstable terrain
- Career changes for mountain personnel

### Infrastructures

- Buildings and other sports infrastructures impacted by melting permafrost and increased risk of falling rocks
- Increased operating costs for infrastructures due to rising energy costs
- Reduction in the water supply of available for making artificial snow, and conflict about using this resource
- Rising minimum temperatures, which impacts artificial snow production
- Reduced supply of water available to high-altitude shelters
- Increasingly complex logistics involved in managing busy periods

### Sports venues and conditions

- Reduction in natural snow cover and areas with no snow earlier in the season or permanently
- Sites and courses impacted by rockfall due to fluctuations in temperature or melting permafrost
- Terrain becoming unstable, collapsing and new crevices opening up
- Changes in access to shelters
- Access to sports sites impacted by heightened wildfire risks (in terms of frequency, length of time and areas affected)
- Areas where sport is prohibited for environmental protection reasons, and highly protected "sanctuary" areas
- Opening of new access routes
- Growth in peripatetic sports encouraged by milder weather

### The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

### Economic models

- Economic model impacted by increased costs of insurance, materials etc..
- Certain races can no longer be commercialised
- Administrative closure of shelters or mountaineering sectors

## Discipline formats and variations

- Sports calendars / seasons impacted by rising average temperatures
- Change in the seasonal opening of shelters near to routes
- Increased use of high-altitude sites in the summer (such as cooling zones and sports activity on high-altitude lakes, etc.)
- Organisation of sports events and their broadcasts impacted by uncertain weather patterns and weather events
- Discipline impacted by related regulatory changes

In mountaineering[49]:

- 27% of the routes studied can no longer be climbed during the summer due to objective hazards. They have been classified as routes with excessively high levels of danger and/or technical difficulty;
- 3% of the routes have disappeared, either due to receding glaciers or landslides.

49. J. Mourey (2019), "L'alpinisme à l'épreuve du changement climatique : Évolution géomorphologique des itinéraires, impacts sur la pratique estivale et outils d'aide à la décision dans le massif du Mont Blanc" ["Mountaineering put to the test by climate change: geomorphologic evolution of routes, impacts on summer sport and decision-making tools in the Mont Blanc massif"], Doctoral thesis.

# Water sports in inland and coastal water bodies

## Participants and coaches

- Health of the participants impacted by extreme temperatures and heatwaves
- Increased need for lifeguards over the summer months, or over long periods which do not solely cover the summer months
- {Fresh water}: Health of the participants impacted by the water quality, particularly due to increases in cyanobacteria and leptospirosis, as well as rising salinisation.

## Infrastructures

- Buildings and sports infrastructure impacted by weather events, rising water levels, floods and retraction / expansion of clay soils
- {Freshwater} Buildings and other sports infrastructures impacted by falling water levels in inland bodies of water, cutting off boat clubs from water-sports areas
- {Sea / coastal areas} Buildings and other sports infrastructures impacted by rising sea levels or retreating shorelines

## Sports venues and conditions

- More people using (inland and sea) sports/bathing areas, which could trigger conflicts of use with other sports, caused by extreme temperatures and heatwaves
- Sites and activity safety impacted by increasingly frequent, severe and sudden extreme weather events
- Restricted access to sites for participants on safety grounds, due to water quality or on biodiversity protection grounds (trampling, disturbance and pollution (scraping of canoes)) in order to help the flora and fauna adapt to the effects of climate change, with an indiscriminate ban on sports
- {Fresh water} Conflict over the use of water resources (such as drinking water management, agriculture, etc.)
- {Fresh water} Some disciplines migrating to mountain lakes (such as kiteboarding and stand-up paddleboarding)
- {Sea / coastal} Increased numbers of jellyfish off the coasts
- {Sea / coastal} Sports areas impacted by rising sea levels and retreating shorelines
- {Sea / coastal} Sports activity made impossible (particularly during summer months and / or due to a high tidal coefficient) for sports requiring beach access
- Inability to wash down sailing equipment (maintenance) during periods when water access is restricted

## The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

## Discipline formats and variations

- Match calendars / seasons impacted by seasonal shifts (rising average temperatures)

# Whitewater sports activities

## Participants

- Health of the participants impacted by extreme temperatures and heatwaves
- Health of the participants impacted by the water quality, particularly due to increases in cyanobacteria and leptospirosis, etc.

## Sports venues and conditions

- Increased use of watercourses and conflicts over usage with other recreational activities and other water users (such as agriculture and hydroelectric power plants).
- Sites less or more accessible, and disciplines less or more feasible due to water shortages, drought, shrinking glaciers and the effects of extreme weather events (such as falling trees and changes to watercourses).
- Sites or disciplines made more dangerous by water shortages (jumping into canyons when canyoning), potentially reducing appeal as the activity is less fun
- Sites or disciplines made more dangerous by the increased severity of heavy rainfall and associated rising water levels
- Mountain sites impacted by landslides or melting permafrost
- Restricted access to sites for participants on biodiversity protection grounds (trampling, disturbance and pollution (canoe scraping)) in order to help the flora and fauna adapt to the effects of climate change, with an indiscriminate ban on sports
- Changes to practise site locations, and their periods of availability, due to modified water flows (changes in the times and intensities of sports activities, sports moving to mountain settings, and based on power station cooling needs)

## The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

## Discipline formats and variations

- Match calendars / seasons impacted by seasonal shifts (rising average temperatures)

# Underwater sports

## Participants and coaches

- Participants' health impacted by extreme temperatures and heatwaves (particularly at times when they are not in the water)

## Infrastructures

- Buildings and other sports infrastructures impacted by rising sea levels or retreating shorelines
- Buildings and sports infrastructure impacted by weather events, rising water levels, floods and retraction / expansion of clay soils

## Sports venues and conditions

- Depletion of the sea bed / noticeable changes to marine biodiversity at various sports sites
- Restricted participant access to sites on biodiversity protection grounds, to help plant and animal life adapt to the effects of climate change.
- Safety of sport impacted by increasingly frequent, severe and sudden-onset extreme weather events

# Sports in swimming pools

## Participants

- Health of the participants and sports performances impacted by extreme temperatures and heatwaves and by rising humidity levels

## Infrastructures

- Filling and maintenance / draining of swimming pools impacted by drought and water availability, restrictions on water reuse and energy costs
- Buildings and other sports infrastructures impacted by extreme temperatures, heatwaves, droughts and availability of water resources, weather events, rising water levels and floods, retraction / expansion of clay soils, etc.
- Thermal comfort inside infrastructures impacted by extreme temperatures and mounting energy costs
- **Opportunity for sport to contribute to urban resilience: swimming pools and / or cool spots are essential when temperatures are extreme**

## Sports venues and conditions

- Increased use of swimming pools as a result of extreme temperatures, heatwaves and the spread of heat islands

## The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

## Economic models

- Economic model impacted by increased operating costs (energy and water use), as well as the costs of insurance, materials, equipment, etc.

# Sports on ice

## Participants

- Changes in ice rink opening periods, impacting sports activities

## Economic models

- Economic model for ice rinks impacted by increase in operating costs (energy)

## Discipline formats and variations

- Appeal / acceptability of some sports among the population (due to energy and water consumption, etc.)
- Prohibitions and regulations: thermal performance, materials, etc.

# Equestrian sports

## Participants and horses

- Health of the participants and horses, and sports performances impacted by extreme temperatures and heatwaves, and by rising humidity levels
- Health risks for the horses (such as illnesses and parasites)
- Delivering quality equine care (hydration / showers / misters) becomes a more complex process due to reduced availability of water resources
- Food: reduced availability of grass / feed, particularly during the summer
- Horses uncomfortable in some fields and/or infrastructures due to extreme temperatures and heatwaves
- Dust caused by dry ground may result in respiratory problems and eye irritation for participants (horses and humans)

## Infrastructures

- Buildings and sports infrastructure impacted by weather events, rising water levels, floods and retraction / expansion of clay soils
- Maintenance of exercise areas restricted due to reduced water availability
- Difficulty in keeping sports running in some infrastructures when temperatures are extreme

## Race courses and green spaces

- Management and maintenance of grass impacted by a set of hazards and indirect effects such as extreme temperatures, heatwaves, drought, availability of water resources, increased costs, and regulations
- **Promoting the use of manure for energy production**

## The image of sport

- Perception of sport impacted by environmental concerns and crises (appeal / acceptability)

## Economic models

- Rising operating costs for infrastructures with increases in energy prices (effect can be seen in the increased need for air-conditioning)
- For some events, in view of the hazards, the economic model is incompatible

## Discipline formats and variations

- Competition with the farming sector for land / resources
- Regulations on restricted fossil fuel usage for transporting horses / energy conservation measures > events held more locally

# Aerial sports

## Participants and coaches

- Participants' health impacted by extreme temperatures and heatwaves, particularly in the cockpit

## Sports venues and conditions

- Safety of activities impacted by changes in weather conditions ("dust devils" and stronger thermals)
- Free flying: Participant safety: violent thermals creating increased turbulence, due to extreme temperatures and drought (increased if accompanied by windy weather)
- Free flying: Increased time for engaging in these sports, due to the decrease in natural snow cover and reduction in average rainfall
- Increased wildfire risk resulting in bans on flying over specific areas
- Appearance of mirages on roadways
- Change in bird numbers and animal-risk management at air hubs
- Thermal restrictions on the use of some aircraft (pertaining to cooling, constructor's operating range, batteries of electric aircraft, etc.)
- Reduction in windows for introductory sessions (major thermals)

## Discipline formats and variations

- Match calendars / seasons impacted by seasonal shifts (rising average temperatures)
- Organisation of sports events and their broadcasts impacted by uncertain weather patterns and weather events
- Regulations limiting the use of fossil fuels and rising energy costs
- Energy moderation measures

# OVERVIEW OF MEASURES

| MEASURES | TIMEFRAME | STAKEHOLDERS RESPONSIBLE |
|---|---|---|
| 1. Task a working group from the National Observatory for Sport with defining **how the impacts of sport on the climate are measured**. | Short term | Government |
| 2. Plan **climate change vulnerability studies** based on the TRACC in each sector of sport, in order to identify the climate conditions and minimum resources required for sports to be practised safely for each type of sports facility, venue and discipline. | Medium term | All stakeholders |
| 3. Step up **the assessment and promotion of the benefits of sport** so as to ensure it is given due consideration in future cross-sectoral trade-offs which will be made inevitable by climate change. | Long term | Government |
| 4. Developing and implementing a **joint awareness-raising and training programme** for sport decision-makers, on the challenges of adapting to climate change. | Medium term | Government |
| 5. Add modules covering adaptation to climate change into all training and certification courses for **sports instructors**. | Long term | Government |
| 6. Train all **managers** of sports venues (such as sports infrastructure and natural areas) on the issues of mitigation and adaptation. | Long term | Local authorities and pay-to-play leisure sports |
| 7. Support **athletes** in their role as ambassadors (or perhaps influencers) for new modes of behaviour, while helping to develop and professionalise their public-speaking skills, their actions to raise awareness with the general public, their advocacy efforts, how to use their image in media and/or their choice of sponsors. | Short term | Sports movement |
| 8. Increase **media** awareness of the adaptation challenges in sport, in order to spread information to the general public. | Long term | Media and Government |
| 9. Leverage **behavioural science** in order to identify behaviours that need to be changed as a priority, analysing behaviours that could provide a potentially attractive solution, then providing long-term support for these behavioural changes. | Long term | Government |
| 10. Every time stakeholders come together, **sessions for discussion and feedback on adapting sports activities and infrastructure should be organised**. | Short term | All stakeholders |

| MEASURES | TIMEFRAME | STAKEHOLDERS RESPONSIBLE |
|---|---|---|
| 11. Encourage **international sports bodies** to anticipate and incorporate ways of adapting sport to climate change into their strategies and plans. | Short term | Government and the sports movement |
| 12. **Tracking the findings** of relevant studies and resources, and sharing them with the stakeholders involved (such as participants, coaches and managers). | Short term | Government |
| 13. Use **sports events** to promote environmentally-friendly sports and their requirements in terms of adaptation, while also ensuring that poorly adapted solutions are not promoted. | Short term | Media, the sports movement and professional sport |
| 14. Help to build **international momentum** around sport and climate. | Short term | Government |
| 15. Monitoring, as part of a joint oversight body, the **implementation and outcomes of the Sport PNACC**. | Medium term | Government |
| 16. Incorporating or boosting the number of outdoor-sport participant representatives **within local consultation bodies,** in order to promote their role as observers and protectors and, at the same time, boost their ability to provide local authorities with information about the climate hazards observed. | Long term | Government, the sports movement and local authorities |
| 17. Incorporate a "climate change adaptation" proviso into **sports innovation support** programmes (such as the ANS) and incorporate a "sports" proviso into ecological-transition innovation support programmes (such as future investment programmes, the BPI public investment bank, France 2030, etc.). | Short term | Government |
| 18. Make government **funding via the ANS, for MISEs or by local authorities** conditional on environmental responsibility by introducing (standardised) criteria for resilience to climate change and energy efficiency. | Medium term | Government and local authorities |
| 19. Encouraging **the funders of sport** to allocate some of their support to adapting sports activity to climate change. | Long term | Government |
| 20. Nominate pairs of **"sustainable development and/or environment advisers"** (a decision-maker and a technical adviser) in various sport structures, boosting their resources, raising their profiles and continuing to build their skills around climate issues. | Medium term | All stakeholders |

| MEASURES | TIMEFRAME | STAKEHOLDERS RESPONSIBLE |
|---|---|---|
| 21. Expand the range of tasks assigned to the **national outdoor sports resources centre** to cover the ecological transition, with a view to providing support to stakeholders in sport, particularly when seeking funding. | Short term | Government |
| 22. Ensure that within each federation, **rules and recommendations for "adapted"** sports activity are adopted whenever the climate conditions and minimum resources required to safely practise the sport cannot be met. | Short term | Sports movement |
| 23. Reorganise **sports calendars and seasons** while taking into account the economic, social and environmental risks and consequences caused by the impacts of climate change. | Long term | Sports movement and local authorities |
| 24. Promote moderation vis-a-vis **the formats and sizes of sports events**, taking climate hazards into account. | Long term | Sports movement, professional sport and the Government |
| 25. Within the technical specifications of plans for the construction and renovation of infrastructures, strengthen **the environmental requirements and the minimum requirements for climate change resilience** in sports facilities. | Long term | Government and local authorities |
| 26. Review the **specifications of international and national federations and professional leagues** to reduce the consumption of equipment, make them more resilient, promote the adaptation of sports to climate hazards, and make them more responsive to climate hazards. | Long term | Government and the sports movement |
| 27. Ensure a suitable balance between the practice of outdoor sports and the protection of natural environments, by putting in place **management tools to help prevent sports sites from becoming overused**, and by supporting and overseeing the development of new natural sports sites. | Long term | The Government, the sports movement, pay-to-play leisure sports and local authorities |
| 28. Refer to analyses of climate impacts on the local region during **discussions prior to decisions** regarding the location, renovation, management and maintenance of each sports facility, area and route. | Short term | All stakeholders |
| 29. Experiment with solutions to help **professions that are vulnerable to climate change to evolve**. | Medium term | Government and Sports movement |
| 30. Test and implement **smart solutions to create diversity in the range of sports activities** available where the main activity becomes impossible due to effects of climate hazards. | Medium term | The Government, the sports movement and pay-to-play leisure sports |

Short term: < 6 months

Medium term: between 6 months and 2 years

Long term: between 2 and 5 years

# CONTRIBUTORS

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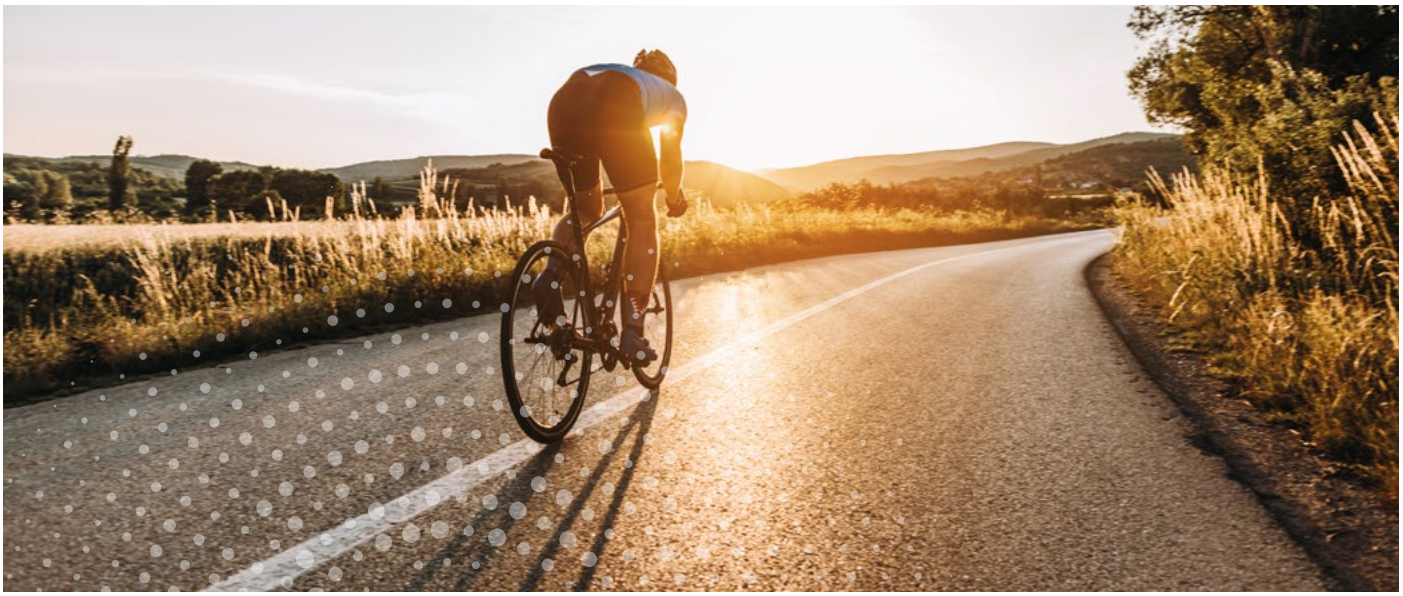
| **MSJVA** | Directorate of Sport, National Outdoor Sports Resources Centre (PRN SN), French Institute of Horse and Riding (IFCE), National Sailing and Water Sports School (ENVSN), French National Maritime Academy (ENSM), the CREPS Auvergne-Rhone Alpes of Vallon-Pont-d'Arc sports facility (CREPS AURA) and the Youth, Engagement and Sport Departmental Unit (SDJES 39) |
| **MTEECPR** | French Office of Climate Change Adaptation |
| **Sports movement** | French federations: Model aircraft flying, air rally, athletics, badminton, basketball, mountaineering clubs, orienteering, cycling, dance, horse riding, underwater sports, football, golf, gymnastics, ice hockey, judo, motorcycling, swimming, parachuting, hiking, rollerblading and skateboarding, rugby, skiing, water-skiing and wakeboarding, caving, motorsports, canine sports and leisure activities, tennis, triathlon, glider flying, free flying, and the UCPA<br>CNOSF |
| **Economic stakeholders including pay-to-play leisure sports** | French National Federation of Horse Racing, Nation French Ski Instructor Union, and Mixed Ice-Skating Union |
| **Professional Sport** | National Rugby League |
| **Local authorities** | Andes, France Urbaine, ANCT |
| **Others** | French Association of Golf Course Maintenance Staff (AGREF); Haute-Savoie Natural Space Conservatory; Clairefontaine National Football Centre; Styx4D (Office of expertise and applied research into geomorphology); General Inspectorate; Centre for Sports Law and Economics (CDES); Mental Health Research Centre of Montreal University (CRIUSMM); Equine Law Institute; Awareness, Training and Advisory body for Sports & Environment/ Climate challenges; Ardèche mountain and gorge guide, ski and paragliding instructor, high-altitude guide |



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